Root and Tuber Crops: Production-use Systems and Food Resilience in Agri-aqua and Agro-forestry Ecosystems in Central Philippines

RESULTS OF A SCOPING STUDY

CIP INTERNATIONAL POTATO CENTER
A CGIAR RESEARCH CENTER

CIAT
International Center for Tropical Agriculture
Since 1967 / Science to cultivate change

CGIAR RESEARCH PROGRAM ON Roots, Tubers and Bananas

IFAD
Investing in rural people

European Commission

DEPARTMENT OF AGRICULTURE

FishCORAL

INTEGRATED NATURAL RESOURCES & ENVIRONMENTAL MANAGEMENT PROJECT

FoodSTART +

Food Resilience Through Root and Tuber Crops in Upland and Coastal Communities of the Asia-Pacific

Root and Tuber Crops: Production-use Systems and Food Resilience in Agri-aqua and Agro-forestry Ecosystems in Central Philippines
Results of a Scoping Study

April 2016

Julieta Roa, Arma Bertuso, Divina Villaber, FishCORAL and INREMP team

CONTENTS

TABLE

FIGURES

ACRONYMS AND ABBREVIATIONS

BAR	Bureau of Agricultural Research
BAS	Bureau of Agricultural Statistics
BFAR	Bureau of Fisheries and Aquatic Resources
CHARMP2	Second Cordillera Highland Agricultural Resource Management Program
CLEAP	Concepcion Livelihood Environmental Association Project
CIP	Centro Internacional dela Papa (International Potato Center)
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DENR	Department of Environment and Natural Resources
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
FGD	focus group discussion
FISHCORAL	Fisheries, Coastal Resources and Livelihood Project
FNRI	Food and Nutrition Research Institute
FOODSTART	Food Security Through Asian Roots and Tubers
FOODSTART+	Food Resilience Through Root and Tuber Crops in Upland and Coastal Communities of the Asia-Pacific
FSSP	Food Staple Sufficiency Program
IFAD	International Fund for Agriculture Development
INREMP	Integrated Natural Resources and Environmental Management Project
JICA	Japanese International Cooperation Agency
LETMULCO	Lundag Eskaya Tribe Multipurpose Cooperative
MSME	micro, small and medium enterprise
NEDA	National Economic Development Authority
NGO	non-government organization
NMSVA	Nagkahiusang Mag-uuma sa San Vicente Association
NNC	National Nutrition Council
NNS	national nutrition survey
OPT	Operation Timbang

PhilRootcrops	Philippine Rootcrops Research and Training Center
PO	people's organization
PSA	Philippine Statistics Authority
RDE	research, development and extension
RTC	root and tuber crops
SCARED	San Carlos Association for Rehabilitation of Environmental Denudation
SMART	San Miguel Association Resource Team
SSU	Samar State University
VSU	Visayas State University

ACKNOWLEDGMENTS

The FoodSTART+ scoping study would not have been successful without the host of active partner contributors: government agencies (national, regional, and local), non-government organizations (NGOs), farmers and fisherfolk in focus sites, people's organizations, and technicians. With the limited time and on-top-of-existing workload commitment of all partners, the different positive and timely engagements in the field could be an indicator of a really good implementation ahead.

The scoping study team would like to acknowledge with much appreciation the crucial role of the Department of Agriculture - Bureau of Fisheries and Aquatic Resources (DA-BFAR), national and regional focal persons: Ms. Jessica Munoz, National FishCORAL Project Leader, Regional Director John D. Albaladejo, and his dynamic staff, Ms. Viodela Canillas-Pen and Ms. Grace Jaradal, and Assistant Regional Director Justerie Granali. They facilitated the fieldwork and provided all the necessary information needed for this study.

The provincial and local staff of the Department of Environment and Natural Resources -INREMP led by PENRO-Bohol Forester Nestor Canda and the national management team led by Mr. Percival Cardona and Francis Joseph Abello, together with the respective watershed management project officers and local staff of the pilot watersheds; and especially the designated staff for the scoping study in Bohol, Ms. Ivy Joy Rodemio, have been very supportive in the conduct of the study and workshop in Bohol.

The National Economic and Development Authority in Region 8 was the major source of information and we thank Regional Director Bonifacio. Uy and Mr. Jensen Rico for providing the relevant data that gave useful insights on the region's economic status and ongoing projects.

EXECUTIVE SUMMARY

With the objective of collecting evidence to understand the realities and potential of the root crop food and livelihood systems in IFAD investment project sites, a 4-month scoping study was conducted, including a stakeholder validation workshop in two project sites: FishCORAL of the Bureau of Fisheries and Aquatic Resources in Leyte and INREMP of the Department of Environment and Natural Resources in Bohol. With the differing environments of the watersheds (INREMP-Bohol) and aqua-agri systems (FishCORAL-BFAR Region 8/Leyte) involving smallholder farmers and fisherfolk; the study hoped to find opportunities in enhancing the strategic role of RTCs to achieve food resilience and address socioeconomic and physical vulnerabilities and risks in disaster-prone communities and households in the pilot focus sites.

Using a blend of qualitative methods (mainly focus group discussions [FGDs] and key informant interviews [KIIs]), direct observation, analysis of secondary data, and review of relevant documents and reports, the pilot sites were characterized in terms of food and livelihood systems and challenges and opportunities related to RTC value addition. Potential peoples' organizations (POs) in the focus sites were identified for development towards food resilience and sustainable livelihoods that integrate RTCs in agroforestry (INREMP in three watersheds) and fish-farm systems (FishCORAL in seven initial people's organizations).

It was found that RTCs are an important part of the food and survival strategy of resource-poor households in both upland and coastal communities. Sweetpotato, cassava, taro, and aroids are grown in mixed, rotation, or priming systems mainly for home use (70–100%), with surplus for local markets and native delicacy processing, the latter usually intermittently with banana and glutinous rice delicacies. In the pilot sites, small pockets of market-oriented production are found in towns of Dulag (sweetpotato and taro), Pinabacdao-Calbiga (taro, aroids, sweetpotato, cassava), Lawaan (cassava and taro), Hinunangan-Silago (cassava and sweetpotato). Limited markets, inadequate access to and knowledge of technologies, and poor resources seriously constrain rural people from getting health and economic benefits from RTCs. People have a positive attitude toward RTCs and recognize their importance as supplemental staple food and as nutrient sources in food-lean months and during food crises. RTCs are considered part of their farm systems. The FGDs revealed how women play an important role in growing RTCs as garden and small field crops. Women use RTCs in meal preparation and when processed, in augmenting incomes. They pointed out the challenges that must be addressed in RTC cultivation: lack of knowledge on new technology, inadequate development support services, and weak links to markets.

Validation with stakeholders involved in both FishCORAL and INREMP also revealed the same lack of knowledge on RTC potential among the partners. Thus, capacity development of partners and beneficiaries is both a challenge and opportunity. Constraints and potentials for each site have been discussed in the validation workshop. Major differences were spelled out to identify the appropriate RTCs for the different

systems, along with the support services needed. Importantly, the feasibility of integrating RTC technologies and innovations into agro-forestry and fish-farm systems was pointed out. POs were identified together with their potential product mixes. Initial action agenda were also recommended for the challenges and opportunities identified in FishCORAL and INREMP focus sites.

1 INTRODUCTION

1.1 Background

As one of the most populous countries in the world (100.9 million according to the 2015 census), the Philippines is often characterized as a nation marked by inequality and vulnerability. Poverty incidence (30% on the average), malnutrition, low farm and labor productivity, and double-digit unemployment contributed to slow economic growth. High exposure to natural calamities and disasters aggravates an already vulnerable condition. These threats to socioeconomic and physical vulnerability highlight the continuing challenges related to food and community resilience, particularly those in areas with higher risks such as in Eastern Visayas (Region 8).

The food security agenda of the government is reflected in the multi-food-energy source Food Staple Sufficiency Program (Department of Agriculture, 2012, p. 15) which now includes root and tuber crops (RTCs) like sweetpotato and cassava, as well as corn, banana and *adlai* (Job's tears). RTCs have been a staple and a source of nutrients among ethnic communities, upland/highland communities, and resource-poor smallholder farm systems. There is increasing recognition that RTCs can help make people food- and nutrition-secure and can provide sources of income from fresh roots and processing markets involving a range of food and non-food uses. Opportunities for both women and men to benefit from these value chains are variable and require greater research and development attention. Historically, RTCs served as reserve/survival crops during acute food crisis situations following extreme weather events (e.g., recent post-Haiyan disaster in Leyte), and in periods of famine in the past (e.g. in Africa, Japan, and China).

The food security framework stresses the tri-dimensional components of food availability, access, and utilization with risks and vulnerability treated as "pervading threats." The Food Resilience Through Root and Tuber Crops in Upland and Coastal Communities of the Asia Pacific (FoodSTART+), however, stresses explicitly the cross-cutting aspects of vulnerability and resilience using an approach to food security that takes into account "*social and ecological influences at multiple scales, incorporates continuous change, and acknowledges a level of uncertainty that has the potential to increase a system's resilience to disturbance and its capacity to adapt to change."* With the growing recognition of climate change impact on food systems and food security, addressing this gap is critical (CIP-FoodSTART+, 2015).

With significant reduction of poverty as its vision, the International Fund for Agriculture Development (IFAD), the funding source of FoodSTART+, is geared to enable poor rural people to improve their income and food security and provide better food, education, and health care for their families. Since 1978, IFAD has committed a total of US$168.8 million in financing 13 projects related to agricultural development in the Philippines (IFAD, 2016).

IFAD's current strategy in the Philippines has evolved from the government's own strategic initiative contained in the social reform agenda toward inclusive growth, from IFAD's own strategic framework and key strategies for Asia and the Pacific, and from lessons learned from past operations in the country. Past experience has sharpened the focus of IFAD's activities to concentrate on the least-favored communities like those in upland and coastal areas; home to many of the country's poorest people. Target groups include the poorest rural people, notably women and indigenous peoples living in highly fragile and vulnerable ecosystems, agrarian reform beneficiaries in the uplands, coastal fishers, and landless people.

Implemented by the International Potato Center (CIP), FoodSTART+ is an IFAD-funded grant project tasked to help in the capacity development of the IFAD investment projects in the Philippines and other Asian countries (India, Indonesia, and Vietnam)—i.e., to help improve their delivery of outcomes. FoodSTART+ aims to promote RTC cultivation as a way to reduce food vulnerability and enhance the resilience of poor male and female agricultural producers and consumers in the Asia-Pacific. It aims to improve food security and nutrition, raise income, and strengthen resilience through RTCs in different agro-ecologies.

The FoodSTART+ collaborative investment project partners in the Philippines include:

- **Fisheries, Coastal Resources, and Livelihood Project (FishCORAL), Department of Agriculture – Bureau of Fisheries and Aquatic Resources (DA-BFAR) – Region 8**

FishCORAL is an IFAD investment project that targets 1,098 coastal barangays as beneficiaries. The goal is for the fishery sector to become part of inclusive growth and participate in efforts to reduce poverty, improve economic status, build capacity in coastal resource management, improve the productivity of inshore waters, and explore the export potential of fisheries—all these for improved food security and nutrition and overall GDP growth.

- **Integrated Natural Resources and Environmental Management Project (INREMP), Department of Environment and Natural Resources (DENR) - Bohol province**

INREMP is another IFAD investment project that started in 2013 and will end in 2020. It seeks to provide livelihood to some 350,000 households living in 2,201 barangays within the following four river basins: Chico in the Cordillera Region, Wahig-Inabanga in Central Visayas, Bukidnon in Northern Mindanao, and Lake Danao Watershed in ARMM (Department of Environment and Natural Resources, 2015). The objective is to improve the quality of life of rural communities in the Upper River Basins by sustainably managing natural resources with stakeholder participation and ensuring that local institutions effectively govern river basin resources as an enterprise that generates revenue from conservation and livelihood. INREMP-Bohol Province is the FoodSTART+ partner, which covers four watersheds: Inabanga, Danao, Dagohoy, and Wahig-Pamacsalan. Because the Inabanga watershed is mainly for reforestation, the other three watersheds were

identified as the target sites of FoodSTART+ within the agro-forestry components where RTCs are an important part of the farm and food systems of households.

1.2 Objectives

This scoping study was designed to collect and analyze secondary information on RTC production, processing, marketing, and consumption in target areas covered by the IFAD investment project partner and the wider province/state (i.e., locate RTCs in the wider livelihood systems) in order to provide the bases for planning and action.

Specifically, the scoping study aims to:

- collect, collate, and analyze additional information from the target area related to the development of climate change scenarios for RTCs;
- identify key actors and stakeholders across public and private sectors and civil society with whom FoodSTART+ can engage in action research and policy inputs to improve RTC contribution to food security; and,
- identify key problems and opportunities for attention by FoodSTART+ in the context of partnership with IFAD investment projects and information gaps where further assessments on specific topics are justified.

1.3 Scoping study process and work team

The Philippine scoping study team consisted of staff from CIP and VSU-PhilRootcrops and designated staff from IFAD investment projects FishCORAL and INREMP. A VSU researcher was hired by FoodSTART+ from September to December 2015 to collect, process, and help analyze identified data and information needs. Partner leadership of the scoping study was provided by Arma Bertuso from CIP and Dr. Julieta Roa from VSU.

The FoodSTART+ technical working group was formed to help formulate and review the conceptual framework and procedures, review scoping study outputs for quality, analyze findings across sites/countries, and help refine an action plan for implementation.

Table 1. Scoping study team

Organization	Members
Visayas State University	• Dr. Julieta Roa, Professor • Divina Villaber, Research Assistant
FishCORAL	• Jessica Munoz, National Project Leader • Justerie Granali, Assistant Regional Director – BFAR Region 8 • Viodela Canillas-Pen and Grace Jaradal, BFAR Region 8 staff
INREMP	• Percival Cardona, Planning Officer, National Coordinating Program Office • Francis Joseph Abello, Watershed Management Specialist, National Coordinating Program Office • Ivy Joy Rodemio, M&E Officer, Bohol province
CIP-FoodSTART+	• Arma Bertuso, Senior Research Associate

2 METHODOLOGY

2.1 Secondary data and documents

Secondary data were collected from local government units and government agencies such as the Department of Agriculture (DA), Department of Trade and Industry (DTI), National Economic and Development Authority (NEDA), Department of Environment and Natural Resources (DENR), Department of Social Welfare and Development (DSWD), and the National Nutrition Council (NNC). Online research was another main source, particularly of government agency-based data/information like economic performance reports, agricultural statistics, and other related documents. Where personal contacts were available, particularly in key government agencies such as NEDA and DA, collection of data and relevant information was facilitated.

2.1.1 Field appraisals: primary data gathering

Key informants consisted mainly of technicians, LGU and government agency officials, RDE practitioners, and project focal staff. The interviews were conducted to verify secondary data and fill the gaps, as well as clarify issues; understand local trends, opportunities, constraints, socio-political dynamics; and establish contact and working relationships for later joint actions.

Those interviewed included representatives from:

- Government agencies/institutions in agriculture RDE, natural environment, trade and industry, planning and investment and health and nutrition sectors
- National and international NGOs
- Value chain actors, including those from the private sector in all scales (from small households and cooperatives to large multinationals), and stages in value addition (rural traders to exporters)
- Previous development projects and initiatives or projects on RTCs

Focus group discussions (FGDs) with farmers were also held. Each FGD had 8 to 12 participants, gender disaggregated. The participants chosen were specifically located in target IFAD investment project areas where RTCs are important for livelihood and food security. The FGDs tackled the following topics:

- RTC production, marketing, and rural processing in the context of production, livelihood and food system; RTC contribution to agro-ecosystem
- Issues related to vulnerability, resilience, the role of RTCs in post-disaster situations and extreme weather events

- Perceptions of food security and insecurity; changes in household diets; perceptions of "good" food/diet, consumption and nutrition, livelihood activities, migration
- Changes in roles of men and women; other issues around gender that need to be explored
- Adaptive or organization capacity in terms of scoping

Gender-disaggregated FGDs were conducted in seven sites in Leyte representing four bays, and three sites with six POs in Bohol representing two watersheds with agro-forestry component. A total of 14 FGDs in Leyte and six FGDs in Bohol were completed. A summary of the FGD participants is shown in Table 2 and the criteria used in choosing the FGD sites are given in Table 3.

Table 2. FGD participants in the two project sites

Project Sites	Participants	
	Men	Women
BFAR REG 8: FISHCORAL		
Leyte Gulf		
Tolosa, Leyte	7	9
Basey, Samar	10	10
Lawaan, Eastern Samar	12	13
Matarinao Bay		
General Mac Arthur	10	10
Maqueda Bay		
San Sebastian, Samar	12	12
Calbiga, Samar	10	10
Silago-Cabalian Bay		
Hinunangan Southern Leyte	9	8
DENR BOHOL: INREMP		
Wahig-Pamacsalan Watershed		
Lundag PO,Pilar (LETMULCO)	10	8
San Vicente PO, Pilar (NMSVA)	11	12
Danao Watershed		
SMART, SCARE, CLEAP POs	11	9

Table 3. FGD site selection criteria

Criteria	FishCORAL-BFAR-LEYTE	INREMP-DENR-BOHOL
Opportunity/potential of RTCs in livelihood and food security improvement	X	X
Relatively bigger area or diversity of RTCs	X	
Importance of the link to aquatic farm systems (uplands)	X	
Agro-forestry component has existing RTCs identified as part of farm systems		X
Proposals of POs already endorsed for 2016 funding		X
Positive view/perspective of the proposed FGD site from the investment project partner	X	X

2.1.2 Location mapping and RTC suitability

Figure 1. FoodSTART+ partners in the Philippines

FishCORAL Sites

Figure 2. Mapped focus sites of FishCORAL-FoodSTART+

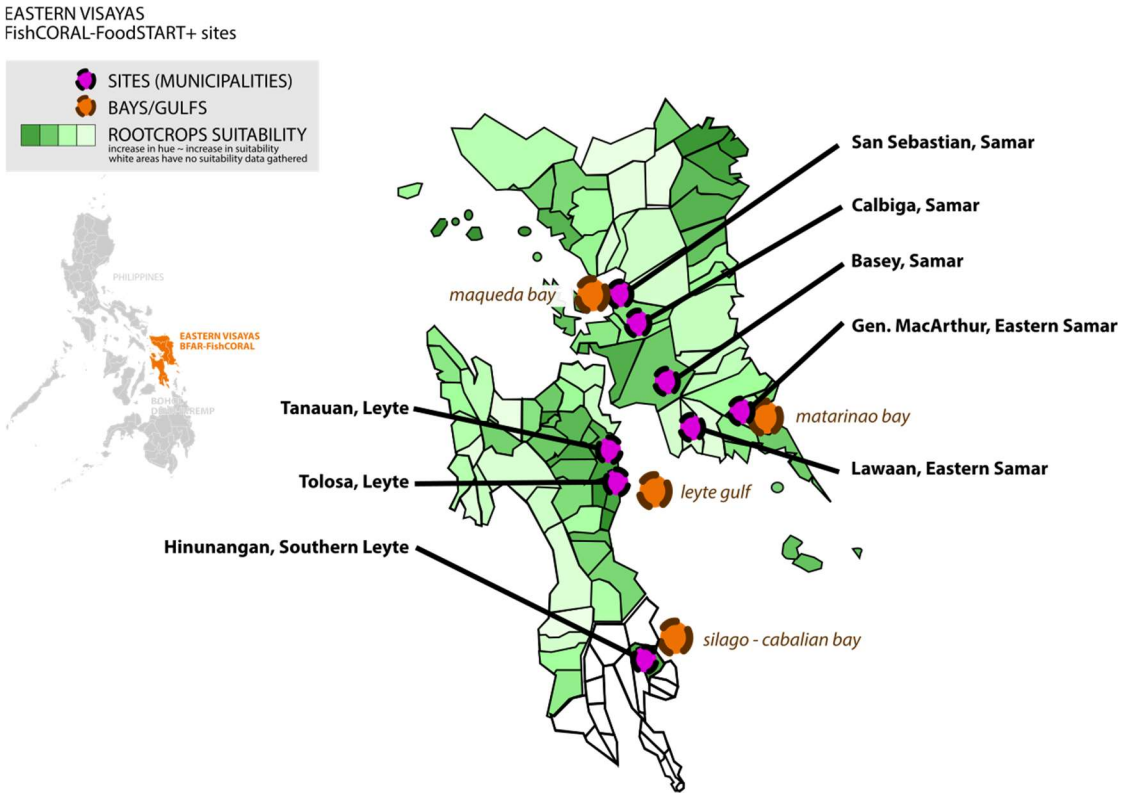


Table 4. FishCORAL-FoodSTART+ identified focus sites

Bays	Communities	RTCs
Maqueda Bay	Calbiga – San Sebastian cluster	sweetpotato, taro/aroids
Matarinao Bay	General MacArthur	sweetpotato, taro
Leyte Gulf	Lawaan, Basey, Tolosa, Tanauan	sweetpotato, taro, cassava
Silago – Cabalian Bay	Hinunangan	sweetpotato, cassava

The FishCORAL-FoodSTART+ sites are the coastal municipalities along Region 8 belonging to four bays: Matarinao, Maqueda, Leyte Gulf, and Silago-Cabalian Bay. The communities around these bays were severely affected by super typhoon Haiyan.

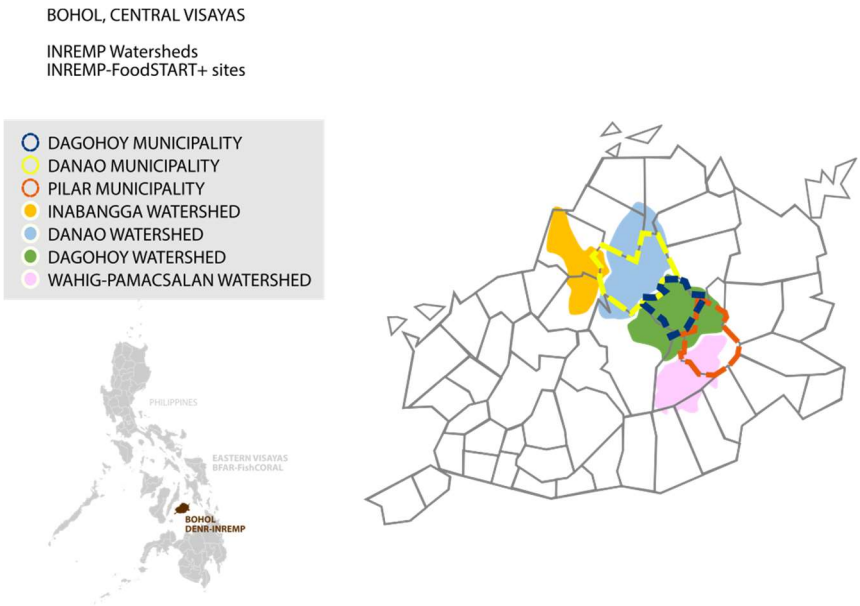
Using the vulnerability and suitability assessment framework (eVSA) of the Philippine Rural Development Project (Department of Agriculture, 2015), area suitability maps of FishCORAL pilot areas for RTCs were generated. The darker-shaded areas in the maps show that RTCs are suitable to highly suitable in the pilot municipalities of FishCORAL where most fisherfolks are engaged in growing sweetpotato, cassava, taro and other aroids, together with corn, banana, and garden vegetables to sustain them during lean months and during food crises brought about by extreme weather events. The identified focus sites (Lawaan, Basey in

Matarinao Bay, San Sebastian-Calbiga, Maqueda Bay; Tolosa and Tanauan in Leyte Gulf) where the FGDs were conducted are all shown to be highly suitable to RTC cultivation.

INREMP sites

INREMP-FoodSTART+ sites are municipalities within the watershed areas of Wahig-Pamacsalan, Danao and Dagohoy. These communities were greatly affected by a 7.2-magnitude earthquake in 2013.

Figure 3. Site map for DENR-INREMP Bohol showing four watersheds and INREMP-FoodSTART+ sites



The map shows the estimated agro-forestry areas in the respective focus sites, the identified RTC site that can be integrated into the agro-forestry systems, and the identified POs (details in another section). The Inabanga watershed is mainly devoted to reforestation. The identified sites are upland areas and, traditionally, RTCs are an important part of the food systems here. Market orientation is minimal, and home use for food and feeds is most common.

Table 5. INREMP site characteristics

Watershed	Total Area (ha)	Municipalities	INREMP agroforestry area (ha)	People's organizations	RTCs
Inabanga	13,928	• Carmen • Danao • Inabanga • Sagbayan	None; mainly reforestation		
Danao	13,339	• Trinidad • **Dagohoy** • **San Miguel** • Talibon • Getafe	Ca. 100	SMART SCARED	• **Dagohoy**: cassava and sweetpotato • **San Miguel**: sweetpotato and taro
Dagohoy	21,637	• Carmen • **Dagohoy** • **Danao** • **Pilar** • San Miguel • Sierra Bullones • Ubay	Ca. 70	CLEAP	• Mainly cassava for PhilStarch, ca. 1000 has • Sweetpotato and taro in patches and gardens
Wahig-Pamacsalan	13,889	• Duero • G. Hernandez • Jagna • **Pilar** • Sierra Bullones	Ca. 50	LETMULCO NMSVA	• Mainly cassava for PhilStarch • Sweetpotato, taro, and yam in patches and gardens

3 SITUATION ANALYSIS

3.1 Eastern Visayas, Region 8

Region 8, one of BFAR-FishCORAL pilot sites, is located east of the central Philippine islands facing the Pacific Ocean. The islands of Leyte (two provinces), Samar (three provinces), and Biliran have a total land area of 2.14 million ha. There are relatively flat areas near and along the coasts and mountainous areas in the middle. The lowlands are endowed with fertile soil, abundant water, and wet climate; conditions suitable for agriculture. Two types of climate exist: A (wet or rainy) and C (moist or rain sufficiently distributed). (National Economic and Development Authority, 2014)

3.1.1 Poverty situation

Poverty incidence in Eastern Visayas increased in the aftermath of super typhoon Haiyan. This has been a big challenge to the region. The slow economic growth is attributed to lack of employment opportunities; less developed micro, small and medium enterprises (MSMEs); low labor productivity; underdeveloped tourism industry; high underemployment rate; persistent insurgency in Samar Island; high vulnerability to disasters; and low human capital. Poverty incidence from 2006 to 2012 in Samar has worsened, particularly in Eastern Samar and Western Samar, which already have a high poverty incidence base to begin with (Fig. 5). The situation in Leyte and Southern Leyte is the same with a lower base. Although, incidence of poverty among senior citizens from 2006 to 2009 has improved due to strong government support, the women and farmer sectors still registered the highest poverty incidence for the period.

Figure 4. Poverty incidence among populations of Region 8 in the years 2006, 2009, and 2012

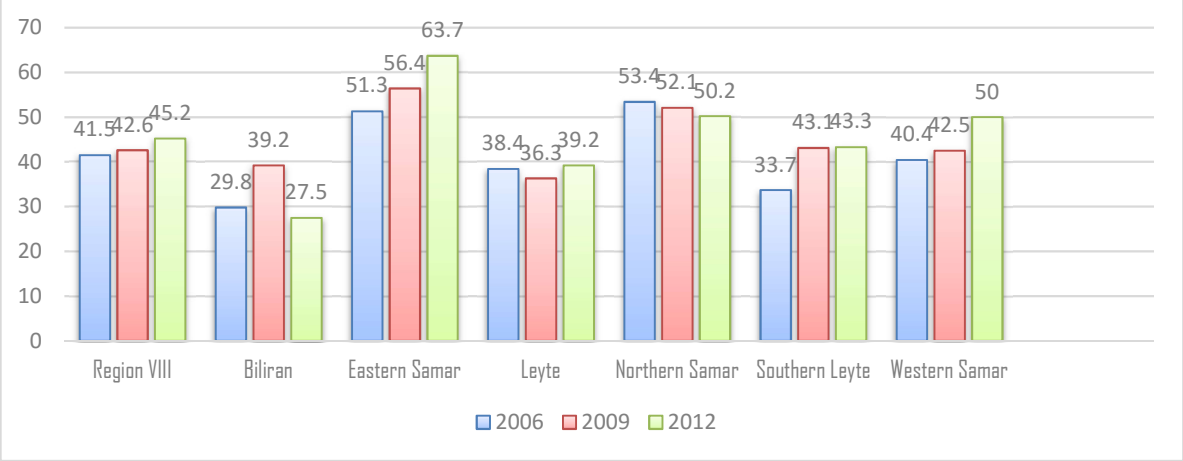
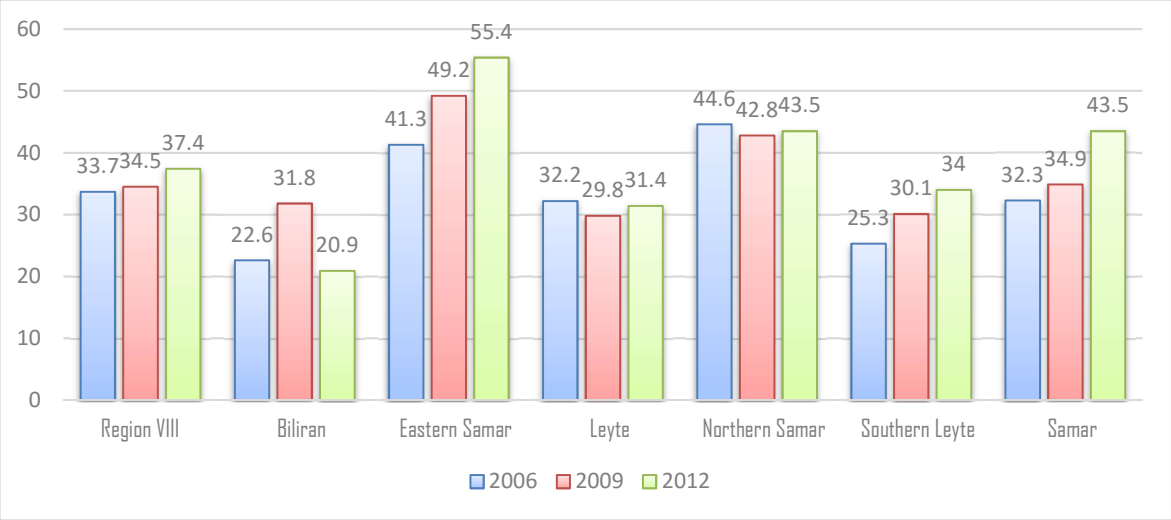


Figure 5. Poverty incidence among families in Region 8 in the years 2006, 2009, and 2012

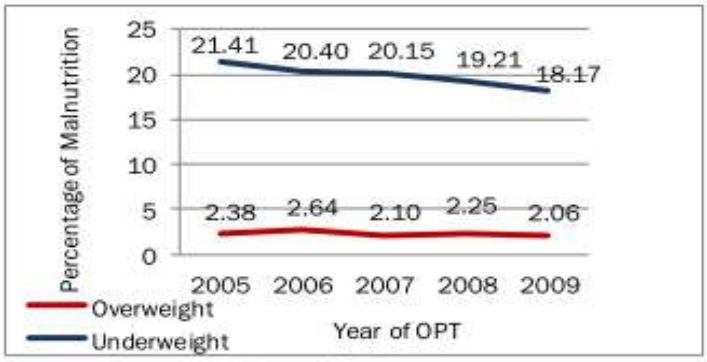


Source: (Philippine Statistics Authority, 2015)

3.1.2 Nutrition status

Malnutrition is relatively high in the region as it is plagued by problems of underweight and nutritionally stunted children, overweight adults, and micronutrient deficiency and disorders among vulnerable groups (children, pregnant women, and lactating mothers). The National Nutrition Survey (Food and Nutrition Research Institute, DOST) showed that the prevalence of underweight children in the 0–5-year-old category in Region 8 increased by 2.2% from 2003 to 2005, and thereafter (2008) stagnated at 32.1%. The occurrence of underweight preschoolers in Eastern Visayas in the 5-year period was higher than the national prevalence. However, based on local weighing, a downtrend of malnutrition among preschoolers has been observed from 2005 to 2009 (Fig. 6). In terms of height, which is another indicator of nutritional status, the region has the highest prevalence of underheight preschoolers in the entire country. The proportion of underheight children in the region was seen to be consistently higher than national estimates in the last three surveys. However, among older children aged 6-10, the number of underweight children continually declined by 3.4% from 2003 to 2008. While poverty is obviously one of the major reasons for undernutrition, another major contributor is the poor caring capacity of mothers and caregivers due to negative values and inadequate knowledge on nutrition (National Economic and Development Authority, 2011).

Figure 6. Trends in the prevalence of malnutrition among 0-6 year-old children, 2005-2009



Source: Operation Timbang (OPT)

3.1.3. Human development Index

The human development index (HDI) is a summary measure of human development, computed using the average achievement in three basic dimensions: a long and healthy life, knowledge, and a decent standard of living. In 2000, the HDI in Eastern Visayas was pegged at 0.656, an improvement of 4.3% over the last 3 years. Among provinces, Southern Leyte, Leyte, and Biliran were slightly better off than the three Samar provinces. Life expectancy was recorded at 69 years in 2000, an increase of one (1) year compared to 1997. During these periods, combined enrolment rate (elementary and secondary) was higher by 1.6% (84.5% in 2000 and 82.9% in 1997), while functional literacy rate was maintained at 83.79%. Real per capita income, on the other hand, decreased to 21,104 PHP from 21,877 PHP[1]. (National Economic and Development Authority, 2011). Table 7 shows the HDI of Region 8 from 1997 to 2009.

Table 6. Human Development Index, Philippines, National Capital Region and Eastern Visayas, 1997-2009

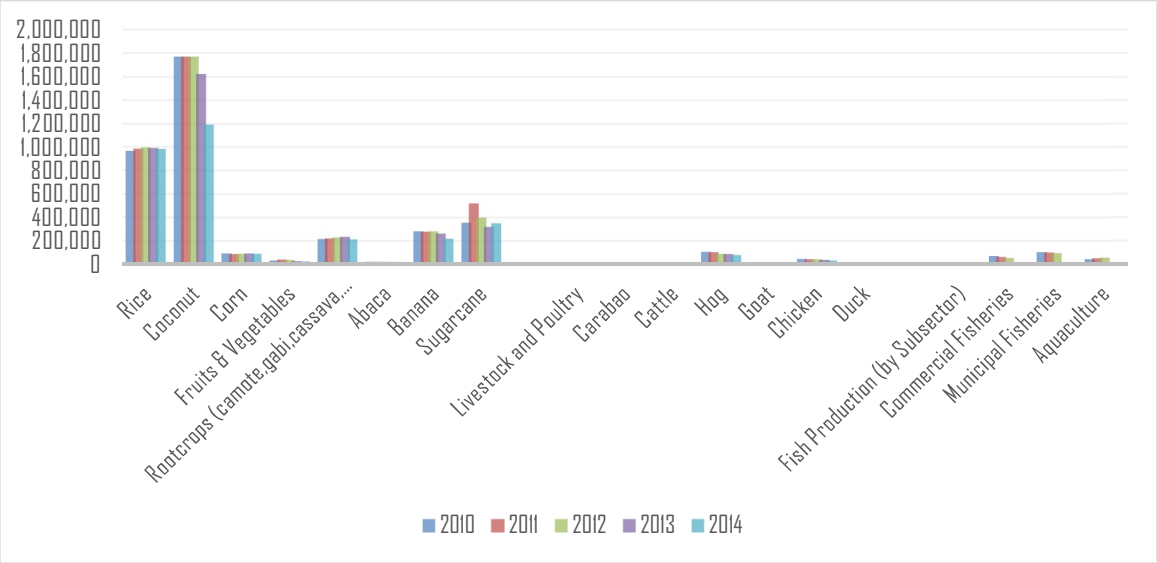
	Human Development Index					Difference			
Region/ Province	1997	2000	2003	3006	2009	2000-1997	2003-2000	2006-2003	2009-2006
Philippines	0.616	0.616	0.615	0.598	0.609	0.000	(1.001)	(0.017)	0.011
NCR	0.846	0.842	0.791	0.780	0.805	(0.004)	(0.051)	(0.011)	0.024
Region VIII									
Biliran	0.484	0.466	0.528	0.619	0.630	(0.017)	0.062	0.091	0.012
E. Samar	0.338	0.373	0.450	0.461	0.450	0.035	0.077	0.12	(0.011)
Leyte	0.487	0.536	0.508	0.522	0.566	0.049	(0.028)	0.014	0.044
N. Samar	0.357	0.380	0.412	0.428	0.432	0.023	0.032	0.016	0.004
So. Leyte	0.425	0.485	0.467	0.485	0.489	0.060	(0.018)	0.018	0.004
W. Samar	0.432	0.405	0.448	0.501	0.461	(0.027)	0.043	0.054	(0.040)

Source: (Human Development Network, 2013)

3.1.4 Agri-industry of Eastern Visayas

Agricultural productivity in Region 8 is lower than the national standard. This is why farm income is insufficient to give rural families a decent life. Since the region is predominantly agricultural, 33.2% of the families there live below the poverty line. The low productivity from agriculture due to natural calamities may have also contributed to the dire situation. The agriculture, fishery, and forestry sectors show a declining productivity trend due to the result of extreme weather events, diseases, decreasing farm size, and low technology adoption. The decline in livestock and poultry production is attributed to the high price of feeds that left some backyard raisers with no choice but to stop operation. The fishery subsector has also declined due to depleted fishing grounds (National Economic and Development Authority, 2011).

Figure 7. Volume of Production on Agriculture and Fishery Industry in Region 8



Source: (Bureau of Agricultural Statistics, 2015)

Table 7. Growth rate of the volume of production on agriculture and fishery industry in Region 8 between the years 2010-2014 (in MT)

Agricultural Sector	2010	2011	2012	2013	Growth Rate (2010-2013)	2014	Growth Rate (2013-2014)
Crops							
Rice	964,145	984,017	994,972	989,794	2.59	982,596	(0.73)
Coconut	1,769,081.84	1,769,951.50	1,771,459.42	1,623,585.95	(8.96)	1,191,923.25	(36.22)
Corn	90,215	83,992	87,333	89,327	(0.99)	88,162	(1.32)
Fruits & Vegetables	31,447.08	37,678.41	36,114.12	26,341.19	(19.38)	21,724.45	(21.25)
Rootcrops (camote, gabi, cassava, ube)	213,218.45	219,939.05	228,328.74	231,860.58	8.04	210,351.74	(10.22)
Abaca	20,326.42	20,023.43	19,190.87	16,597.42	(22.47)	12,849.25	(29.17)
Banana	278,305.78	277,173.15	280,439.13	259,095.35	(7.41)	216,991.24	(19.40)
Sugarcane	352,948.5	516,705.82	395,843.89	318,296.69	(10.89)	348,642.41	8.70
Livestock and Poultry							
Carabao	10,026	10,838	11,210	11,257	10.94	11,368	0.98
Cattle	2246	2,394	2,267	2,483	9.54	2,293	(8.29)
Hog	104,061	101,228	89,240	85,959	(21.06)	76,607	(12.21)
Goat	1400	1,448	1,283	1,130	(23.89)	881	(28.26)
Chicken	43,278	41,675	40,326	35,460	(22.05)	30,422	(16.56)
Duck	1,485	1,494	1,398	1,376	(7.92)	1,392	1.15
Fish Production (by Subsector)					2010-2012) (%)		
Commercial Fisheries	68,499.18	61,228.67	53,084.41	-	(29.04)	-	
Municipal Fisheries	100,845.75	98,212.04	92,806	-	(8.66)	-	
Aquaculture	41,839.07	50,337.03	54,526.12	-	23.27	-	

Root crops have, since 2010, shown modest growth at 8%, higher than that of rice (2.6%). But this value went negative after Typhoon Haiyan in 2014 because clearing operations took time and the farmers were not able to grow according to schedule. The pre-Haiyan growth was contributed mainly by cassava due to emerging dried chips-for-feed market. It may be noted that only root crops and rice showed positive growth during this period. Root crops such as sweetpotato, cassava, taro, and aroids were the 'savior' crops immediately after Haiyan. They were distributed in large measure for food relief and recovery, as well as for livelihood rehabilitation by a number of government and non-government agencies. At the FishCORAL sites, in particular, sweetpotato, cassava and taro were distributed in coastal areas that suffered the most destruction. These areas now have increased RTC production beyond what the local market can absorb. It is timely that, with the FishCORAL project, the focus sites can become RTC growth points for food and livelihood system development within the fish-farm systems.

3.1.5 Disaster situation

The location of Eastern Visayas and its geological makeup expose the region to natural hazards. Disasters (e.g., typhoons, landslides, floods) are major causes of economic downturns. As the Philippine fault line cuts across the eastern sections of the archipelago, the provinces of Leyte, Southern Leyte, and Biliran are earthquake-prone. The coastal section of Abuyog and the upland and mountainous portions of Ormoc City and Isabel (all in Leyte); the hilly areas in Southern Leyte; and Catbalogan City in Samar are most prone to landslides. Coastal and low-lying areas in five of six provinces of the region are tsunami-prone. Low-lying and plain areas of the region are also prone to flooding and storm surges. The region's biggest disaster occurred on November 8, 2013. Most of Eastern Visayas was ravaged by Super Typhoon Haiyan, seriously damaging agriculture, fisheries, and properties in the pilot sites of FishCORAL.

3.1.6 Characterizing the project sites of FishCORAL-FoodSTART+

Seven municipalities were selected as pilot sites for the FishCORAL-FoodSTART+ project. They are specifically located in target IFAD investment project communities where RTCs are important for livelihood and food security. An expanded characterization of the sites is shown in Tables 6 and 7 and Figure 8.

Table 8. FishCORAL-FoodSTART+ sites in Eastern Visayas

Bay	Municipality
Matarinao Bay	General Macarthur, Eastern Samar
Maqueda Bay	San Sebastian, Samar Calbiga, Samar
Leyte Gulf	Tolosa and Tanauan, Leyte Basey, Samar Lawaan, Eastern Samar
Silago-Cabalian Bay	Hinunangan, Southern Leyte

Figure 8. FGD sites in FishCORAL Region 8

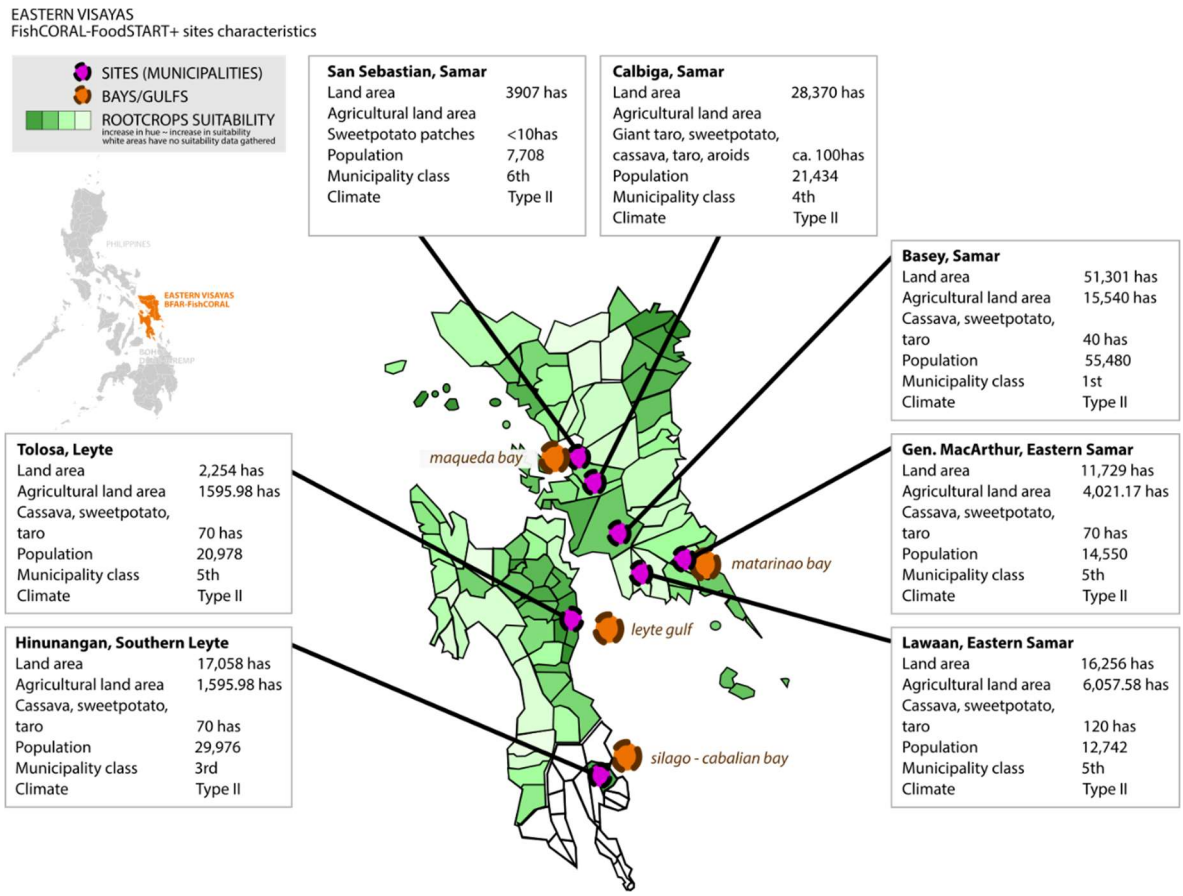


Table 9. Biophysical features of FishCORAL-FoodSTART+ sites.

FoodSTART+ site	Total land area (unit?)	Population	Barangays (no.)	Class	Location	Climate	Geographical coordinates	Soil type	Water sources
General MacArthur, Eastern Samar	117.29	15,097	30	5th	268 km from Tacloban City	Type II	11.2519° N, 125.5392° E		
Tolosa, Leyte	2,254	19,502	15	5th	24 km south of Tacloban	Type II	11.0333° N, 125.0278° E	• Hydrosol • Obando fine sand • Tacloban clay San Miguel silt loam	Guinaron River, creeks, wells, or pumps
Basey, Samar	53,272	46,870	51	1st	28 km from Tacloban City	Type II	11.4097° N, 125.1709° E	• Mountain soil, Dolongan clay loam, Catbalogan Loa, Tingib clay, Catbalogan-Tingib complex	
Lawaan, E. Samar	17,353	11,612	26	5th	Southwestern part of E. Samar; eastern municipality of Marabut	Type II	11.1826° N, 125.2808° E	• Mountain soil, Tacloban clay loam, San Miguel clay loam, Luisiana clay, Maydolong sandy clay loam	

FoodSTART+ site	Total land area (unit?)	Population	Barangays (no.)	Class	Location	Climate	Geographical coordinates	Soil type	Water sources
San Sebastian, Samar	3,907	7,708	14	6th	60 km north of Tacloban City, 48 km south of Catbalogan	Type II	11.6909° N, 125.0278° E	• Clay loam, Faraon clay	
Calbiga, Samar	28,370	21,434	41	4th	l47 km southwest of Catbalogan City	Type II	11.5990° N, 125.0608° E	• Clay loam • mountain soil clay	Piped water system; springs
Hinunangan, Southern Leyte	17,058	28,415	40	3rd		Type II	10.3946° N, 125.1489° E	• Hydrosol • Laylay series • Bongliw series • Pilar series • Penaranda series • San Manuel series • Quingua clay loam • Guimbalaon clay loam • Maydolong series • Faraon series	• Das-ay River • Magata spring • waterfall

***Data obtained from the comprehensive land use plan and municipal/agricultural profile of the municipalities covered by the project, which was provided during the data gathering phase. However, some were not updated, especially population data.

3.2 *Bohol Province*

Bohol Province, the 10th largest island of the Philippines, is classified a first class province by the Department of Finance. It has 47 municipalities (30 coastal and 17 inland) and one component city that serves as the provincial capital and primary gateway to Bohol. It has 61 smaller offshore islands and islets. Bohol is generally flat and plain, with only few mountainous areas in the northeastern portion suitable for cultivation of agricultural crops. The slopes of these mountain areas have good potential for commercial/urban and even industrial site development because of their natural drainage capacity. Some of these mountainous areas, particularly those preserved from degradation, can serve as habitat for interesting flora and fauna as well as natural geologic formations such as the karst topography of the Chocolate Hills, a famous tourist spot. The interior uplands have potential for commercial forestry, fruit production, livestock raising, and, to a certain extent, high-value crop production.

3.2.1 Poverty situation

Bohol has also experienced a notable increase in the percentage of families living below the poverty level from 1994 to 2000 and is now ranked at number 16 among the top 20 poorest provinces in the country. The factors contributing to this high poverty incidence are: 1) seasonal lack of employment, particularly in agriculture; minimal opportunities for off-farm employment that do not match the tremendous growth in labor force; and 2) decrease in the purchasing power of the peso vis-à-vis the increase in prices of basic commodities and rapid population growth.

3.2.2 Human development index

There was improvement in the HDI of the province. This positive trend shows that, despite a limited cash income, Boholanos (the people of Bohol) have managed their resources well enough to minimize the impact of low income on their quality of life.

Table 10. Human development index of Bohol and NCR in comparison with that of the Philippines

	HDI					Differences			
Region/ Province	1997	2000	2003	2006	2009	2000-1997	2003-2000	2006-2003	2009-2006
Philippines	0.616	0.616	0.615	0.598	0.609	0.000	(0.001)	(0.017)	0.011
NCR	0.846	0.842	0.791	0.780	0.805	(0.004)	(0.051)	(0.011)	0.024
Bohol	0.354	0.398	0.430	0.440	0.482	0.044	0.031	0.011	0.041

Source: (Human Development Network, 2013)

3.2.3 Nutrition status

Malnutrition is not much of a problem in the province with 94% of the population observed to have normal nutrition status. Operation Timbang (OPT) results in 2014 showed a minimal number of underweight children and a high percentage of those with normal weight (National Nutrition Council, 2014). However, Dagohoy, one of the municipalities included in the INREMP-FoodSTART+ project site was in the top 10 places with the most number of malnourished pre-school children.

Table 11. Nutrition status of children in Bohol based on 2014 Operation Timbang results

Age group	Severely underweight (%)		Underweight (%)		Normal (%)		Overweight (%)		Total weighed (%)	
Months	M	F	M	F	M	F	M	F	M	F
0-5	0.37	0.37	1.30	1.01	96.67	97.16	1.66	1.46	6,158	5,669
6-11	0.45	0.49	2.81	2.37	95.95	96.31	0.79	0.83	6,228	5,687
12-23	0.86	0.76	4.21	3.55	94.28	95.07	0.64	0.62	12,506	11,423
24-35	0.67	1.14	4.74	4.83	93.85	93.55	0.74	0.47	12,971	11,620
36-47	0.68	0.61	4.40	5.29	94.28	93.50	0.64	0.61	12,736	11,843
48-59	0.66	0.61	5.07	5.46	93.50	93.49	0.77	0.44	12,708	11,418
60-71	0.81	0.78	4.96	5.55	93.63	93.17	0.59	0.50	12,610	11,610

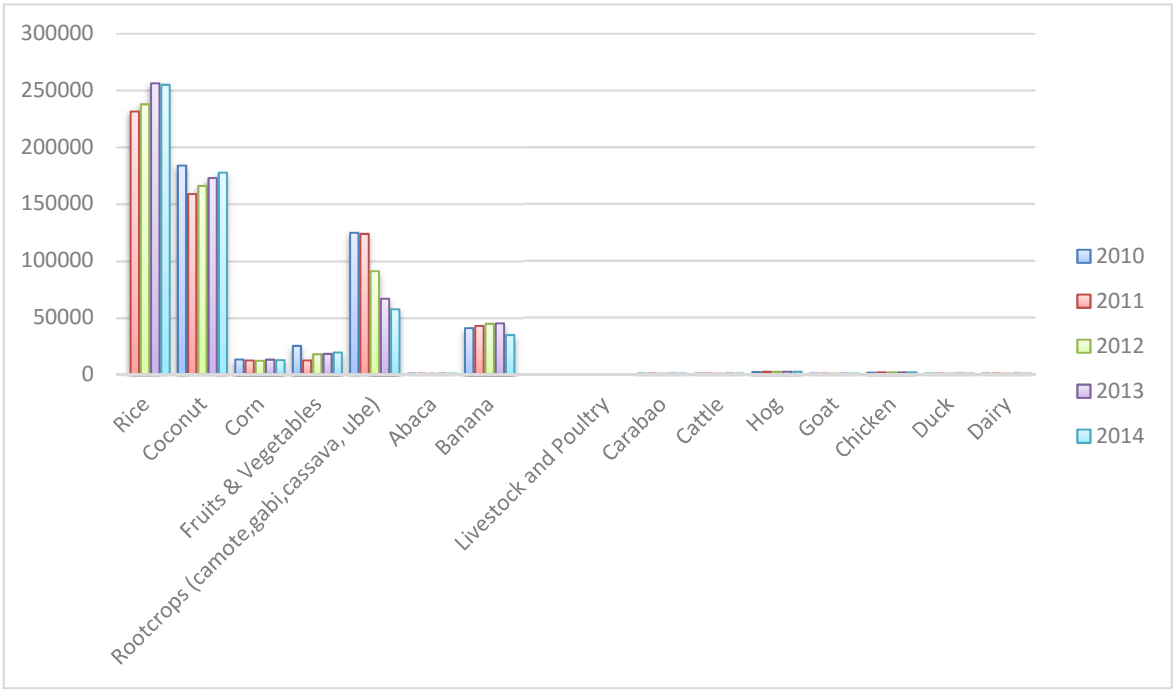
Severely underweight-0.70% | Underweight-4.32% | Normal-94.27% | Overweight-0.70%

Source: (Provincial Planning and Development Office, Bohol, 2014)

3.2.4 Agri-Industry in Bohol Province

Bohol's agricultural productivity has been declining because of pest infestations and occurrence of disasters (e.g., earthquake) in the area. The volume of agricultural produce is shown in Figure 9.

Figure 9. Agricultural production in Bohol, by product, 2010-2014



Source: (Bureau of Agricultural Statistics, 2015)

Table 12. Growth rate of the volume of production of the agriculture industry in Bohol between the years 2010 to 2014 (in MT)

Agricultural Sector	2010	2011		Growth Percentage (2010-2012) (%)	2013	2014	Growth Percentage (2013-2014) (%)
Crops							
Rice	191 ,174	231,569	237,836	19.62	256,405	255,053	(0.53)
Coconut	183,846.67	158,668.3	165,853.66	10.85	172,697.92	177,573.35	2.75
Corn	12,905	11,954	11,611	(11.14)	12,703	12,363	(2.75)
Fruits & Vegetables	24,835.71	11,965.55	17,512.99	(41.81)	17,779	18,987.49	6.36
Rootcrops (camote,gabi,cassava, ube)	124,507.69	123,547.55	90,743.12	**(37.21)**	66,421.7	57,205.88	**(16.11)**
Abaca	38.70	56.30	30.94	(25.08)	16.10	6.28	(15.0)
Banana	40,378.64	42,445.41	44,320.91	8.89	44,793.48	34,401.19	(30.21)
Livestock and Poultry							
Carabao	148.02	147.52	142.73	(3.71)	141.48	143.03	1.08
Cattle	251.74	256.26	253.98	0.88	258.45	261.32	1.9
Hog	1898.16	1940.35	1973.62	3.82	2012.17	2032.30	0.9
Goat	78.45	78.20	75.66	(3.69)	75.42	76.10	0.89
Chicken	1353.13	1414.29	1479.44	8.54	1555.07	1571.76	1.1
Duck	32.98	33.5	33.85	2.57	34.46	34.61	-
Dairy	15.86	16.46	18.49	14.22	19.53	19.73	-

In the 2010-2014 period, root crops suffered huge setbacks due to serious diseases of cassava and purple yam the two major root crops the island is known for (witches' broom and anthracnose, respectively). Bohol has been a hotspot for both diseases since they were reported in mid-2000. Also, the starch processing plant in Carmen slowed down its operations because of the problematic supply chain and some internal problems.

3.2.5 Disaster situation

Being one of the areas in the Philippines constantly threatened by the drastic effects of global warming, Bohol ranked number 9 in the top 20 provinces vulnerable to a 1-meter sea level rise (Jabines & Inventor, 2007). Bohol is one of seismically active places in the country and is, therefore, vulnerable to natural disasters. It is prone to earthquakes and the related hazards such as ground shaking, liquefaction, earthquake-induced landslides, and tsunami. Instrumental monitoring of earthquakes for the past century has detected many small- to moderate-magnitude earthquakes in Bohol Island. As such, the province has incurred significant economic and environmental damage from natural and man-made disasters.

3.2.6 Characterizing INREMP project sites

The FGDs were held in three sites: Lundag, Pilar; San Vicente, Pilar; and Danao. Six FGDs were conducted in the INREMP project sites located in the watersheds of Wahig-Pamacsalan and Danao.

Figure 10. FGD sites in INREMP-Bohol

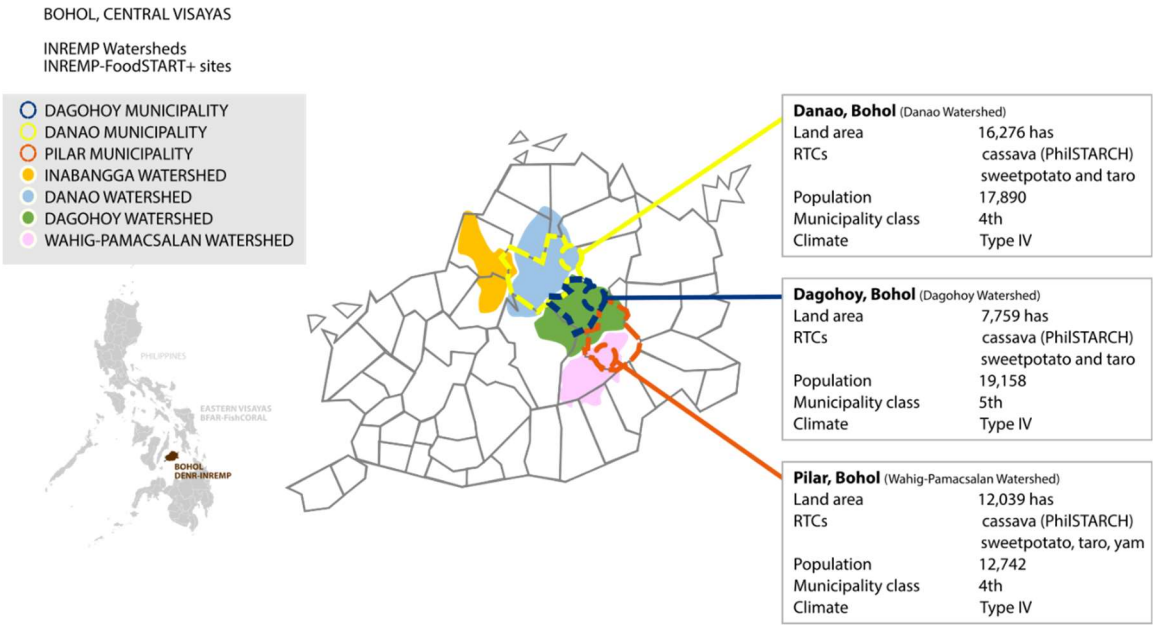


Table 13. Biophysical data of Bohol sites

INREMP Bohol	Total land area (ha)	Population	Villages (no.)	Municipality class	Location	Climate	Geographical coordinates	Soil type	Water sources
Pilar	12,039	27,256	21	4th	77 km from Tagbilaran City	Type IV	9.8411° N 124.3532° E	Faraon clay Ubay clay loam Ubay clay Annam clay	Watersheds
Dagohoy	7,759	19,158	15	5th	73 km NE Tagbilaran City	Type IV	9.8996° N 124.2845° E	Ubay clay Ubay clay loam	Rivers Watersheds
Danao	16,276	17,890	17	5th	95 km NE Tagbilaran City	Type IV	9.9474° N 124.2203° E	Ubay Clay Ubay loam clay Batuan-Faraon clay complex	Wahig River Isomod River

3.3 General information on root and tuber crops

RTCs such as cassava, sweetpotato, taro, yam, and other aroids are grown in all focus sites of FishCORAL and INREMP. Women and men are all engaged in RTC farming. However, women concentrate on subsistence growing, while men are involved in commercial farming. RTC and other food processing and selling activities are mainly done by women because the men are engaged in fishing, and other livelihood endeavors like driving public utility tricycles and carpentry. More women are involved in the sale of the produce in local markets, while the men take care of the outside markets, particularly in the case of cassava meant for the starch factory.

In both FishCORAL and INREMP sites, the average RTC farm sizes range from patches or gardens of a few square meters to about 0.25 ha. A few market-oriented farmers have, on the average, 0.5-1.0 ha grown in mixes, rotation, or intercrop with root crops and vegetables. Commercial farms (especially for cassava) average 0.25–2 ha.

The FishCORAL sites have a number of areas where root crop farming is market-oriented. In Leyte, farmers from Dulag municipality grow sweetpotato and taro for markets. In Western Samar, the towns of Calbiga, Pinabacdao, and Sta. Rita produce aroids, sweetpotato, and cassava. Aroids are the most important crops grown for the market. Cassava and sweetpotato are more important in the Silago-Cabalian Bay areas.

Table 14. Root crop production area (ha) in FishCORAL sites

FISHCORAL site	Area (ha)				
	Cassava	Sweetpotato	Taro	Giant Taro	All root crops
MATARINAO BAY					
Quinapondan, E. Samar	117	76	21	72	
Salcedo, E. Samar	118	65	17.5		430
Gen. Mac Arthur, E. Samar	91.9	-	-	-	412.21
Hernani, E. Samar	110	-	-	-	-
LEYTE GULF					
Balangiga, E. Samar	18.5	-	-	-	286
Giporlos, E. Samar	56	25	9	60	
Guiuan, E. Samar	41.5	75	40	12	
Lawaan, E. Samar	157	20	10	29	
Mercedes, E. Samar		72.5	5	1	
Basey, Samar	297	296	37	-	
Abuyog, Leyte	-	-	-	-	514.62
Dulag, Leyte	-	-	-	-	459.2
Mayorga, Leyte	-	-	-	-	113.5
Tacloban, Leyte	31.64	20.57	16.15		

FISHCORAL site	Area (ha)				
	Cassava	Sweetpotato	Taro	Giant Taro	All root crops
Tanauan, Leyte	-	-	-	-	140
Tolosa, Leyte	-	-	-	-	140
SILAGO-CABALIAN					
Silago, S. Leyte	55	10	3		140
Hinundayan, S. Leyte	-	-	-	-	102
Liloan, S. Leyte	-	-	-	-	127
Saint Bernard, S. Leyte	-	-	-	-	3.14
MAQUEDA BAY					
Catbalogan City, Samar	-	-	-	-	199
Jiabong, Samar	-	-	-	-	400
Motiong, Samar	-	-	-	-	290
San Sebastian, Samar	-	-	-	-	156.89
Calbiga, Samar	-	-	-	-	2527

Legend

All root crops in the area (hectarage/crop not specified)

Other root crops not specified in the area

Note: Data based on municipal agricultural profile taken during data gathering; others based on the Municipal Comprehensive Land Use Plan (however, some data not updated).

RTCs are also commonly grown in Bohol and in INREMP project areas, mostly on rain-fed areas, slopes, and uplands. Farmers in Carmen cultivate cassava used as raw material for starch processing. Purple yam is processed into popular yam-based snack products, and has big commercial value. Sweetpotato, taro, and other aroids are grown in gardens at the focus sites, mainly for subsistence.

Table 15. Root crop production areas (ha) at INREMP sites

INREMP site	Root crop area (ha)				
	Cassava	Sweetpotato	Gabi	Yam	All root crops
Sierra Bullones	345.0				
Pilar	729.6	50	10	1	
Dagohoy					850.0
Danao					379.3

Legend:

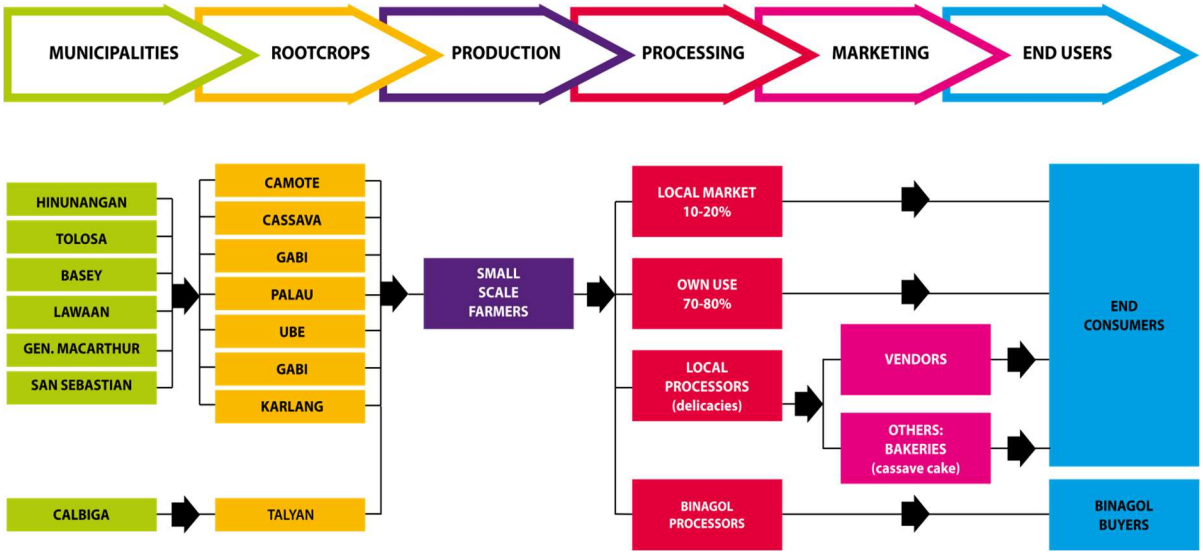
All root crops in the area, (hectare not specified/crop)

3.4 *RTC value chains*

3.4.1 FishCORAL

The RTC value chain in the FishCORAL sites (Leyte-Samar) is shown in Figure 11. The main delicacy that is widely popular and sold to travelers or tourists is *binagol,* steamed grated giant taro. The value chain map shows that most of the RTC produced is consumed at home, but approximately 10-20% goes to local markets and around 10% goes to local processors. Talyan (giant taro) is mainly used to make *binagol*. In the FishCORAL sites, mix of root crops are traded, usually on market days. Calbiga in Maqueda Bay is a major trading post of all root crops, which are being supplied to the northern cities/towns or to places south such as Tacloban City. During the FGDs and reconnaissance surveys, fisherfolk-farmers, especially the women, expressed strong interest in postharvest processing techniques since the fresh root market is very limited. Value addition is seen as promising potential to make a difference in securing an additional source of income.

Figure 11. RTC Value Chain in FishCORAL sites

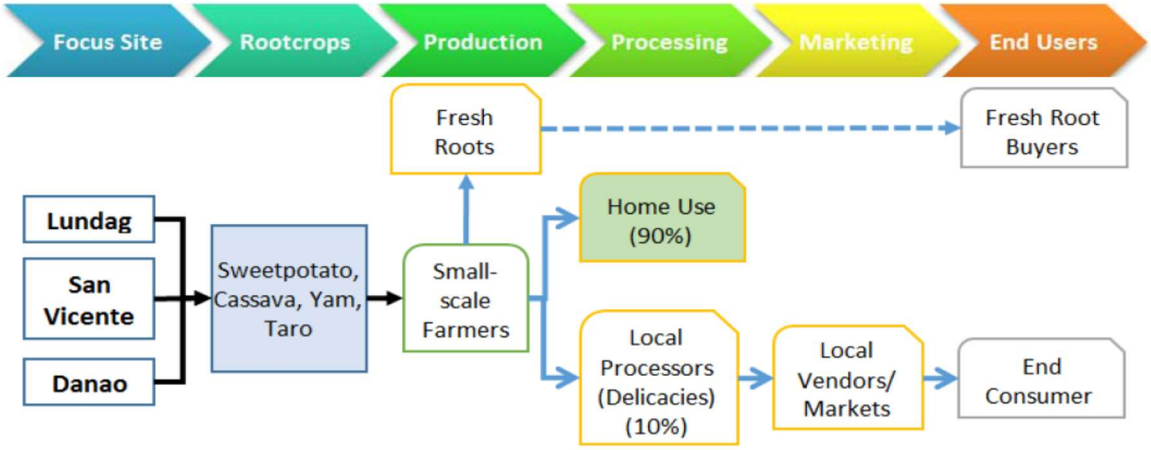


In Basey, fisherfolk-farmers are interested in RTC-based aquaculture feeds because they command a high price. A *binagol* cluster can be further expanded and improved to make it last longer and serve a bigger market outside the region. Fish-based products can also be blended with root crops as in the case of noodles and food products (Tolosa women's groups) and sweetpotato-based sauces and vinegar for ready-to-eat milkfish processing (Tanauan women's group). Both area groups are JICA-supported and are current BFAR initiatives.

3.4.2 INREMP

The RTC value chain in the INREMP-Bohol sites (Fig.12) does not reflect the relatively bigger cassava chain for the starch factory in Carmen. The focus sites are the upland areas in the watershed areas. Cassava is mainly grown in commercial farms in the rain-fed lowlands. In this upland chain, about 90% of production is consumed at home because these communities are not well-linked to the market. Even local home-based processing is not a regular activity. Banana and root crops are processed (as snack food) whenever available, but in a very limited scale.

Figure 12. RTC Value Chain Map in INREMP sites



3.5 RTC for food security, nutrition, and livelihood

3.5.1 Food and diet

RTCs serve as important staple in the upland and coastal areas. They are also used as supplemental food, source of diet diversity, and reserved food source when rice supply gets depleted. For some households, the surplus harvest of RTCs are sold and used to buy grain, dried fish, and other food. They are also processed into native delicacies for the local markets (fried fitters [*maruya*], fried dumplings [*butse*], and cooked in coconut milk [*ginataan*]). Both in Leyte and Bohol, the mother corms of an aroid called *karlang or dansalan* are used as feed for pigs, together with chopped banana trunks and other food wastes. In Bohol, dried cassava chips or *binangkong* are also used as pig feed.

In the Leyte-Samar sites, small fisherfolk grow patches of sweetpotato, cassava, and taro year-round to supply food during the monsoon months. Together with *saba* banana, they are the main staple during these times. Taro leaves and petioles are popular vegetables and are also sold in the local markets. In Western Samar, the popular purplish variety called *iniito* and the white cultivar called *kahislot are* mainly grown for market, as they command a higher price. Sweetpotato and taro are the more popular root crops grown by the womenfolk in home gardens for family consumption together with vegetables such as string beans and eggplants.

3.5.2 Root crops and livelihood

RTCs are nutrient-rich and are excellent raw materials for the processing business. These have high potential in the focus sites inasmuch as RTC processing technologies are already available at PhilRootcrops and in other sites such as Tarlac, Albay, Dapitan, Pampanga, and Tagbilaran. RTCs are important components in household-based livelihood or micro-enterprises and contribute to income. With women at the forefront of these activities, they have greater potential to benefit them and help improve their role in asset management and control.

The low productivity of RTCs is a major concern among farmers. Low yield can be attributed to fragmented land, diverse and undefined land quality, lack of access to quality planting materials, no access to technology and support services, lack of information on RTCs (i.e., opportunities and benefits, traditional production technologies in most areas); not enough motivation to produce more due to limited markets, land tenure/ownership issues, and pest and diseases (e.g., weevil in sweetpotato).

Issues on market and enterprise are also critical. These include the limited market for RTCs; serious lack of support in creating market linkages; less access to development support services, especially enterprise development; and no knowledge about improved utilization of RTCs.

On the whole, farmers and fisherfolk look forward to increased uses of their grown-for-subsistence RTCs. They need substantial assistance to access technologies from production to processing and to establish linkages to markets.

3.5.3 Vulnerability

In all sites, RTCs become "survival" crops in times of food crises, such as during post-disaster periods (usually post-typhoon), lean months during monsoon season, and harvest failure caused by drought or pest infestation. Farmers and fisherfolk grow them as they are easy to manage and require least inputs. They have exhibited less vulnerability to extreme weather conditions as they grow underground. The scoping study revealed that RTCs have always contributed to household/community food resilience. This has been validated by documents and reports from other countries as well.

4 STAKEHOLDER ANALYSIS

The major stakeholders in both FishCORAL and INREMP sites are similar—these are the local government units, government line agencies, academe, research institutions, and the private sector. The roles of the different major stakeholders identified during the scoping study are shown in the matrix.

Table 16. Stakeholder analysis

Stakeholder	Roles	FishCORAL	INREMP
Implementing agencies **BFAR (FishCORAL) DENR (INREMP)**	• Implementing their respective investment projects through the structure built for the purpose; particularly capacitating and supervising their local personnel in the focus sites • Monitoring and documentation	X	X
Collaborative investment partner: **CIP-FoodSTART+**	• Collaborating investment partner for delivery of outcomes of food resilience and overall sustainability of the RC-based systems in the watersheds (INREMP) and fish-farm systems (FishCORAL). Capacity development according to the FoodSTART+ approach. • Monitoring and documentation • Supervision of field staff	X	X
VSU-PhilRootcrops	• Collaborating partner of FoodSTART+ and investment partners; facilitate access to RTC technologies: varieties, integrated crop management, processing, methodology, etc. • Co-supervision of field staff	X	X
Local government units **Leadership Agriculture offices (MAOs)**	• The main local partners; provision of technicians for field implementation, particularly the Farmer Business School (FBS) in respective focus sites of the identified POs; production and propagation (nursery maintenance) of recommended RTC varieties for ready availability to POs, and for sustainability. Assistance in the establishment of community-RTC nurseries.	X	X
Government line agencies **Department of Science and Technology (DOST)- provincial and regional**	• Potential source of technical assistance and monitoring for food safety, good manufacturing practice, FDA registration, nutrient analysis, and shelf life tests • Monitoring of respective function	X	X
Department of Trade and Industry (DTI) – provincial and regional	• A registration and regulatory agency of local POs; potential source of fund assistance for needed	X	X

Stakeholder	Roles	FishCORAL	INREMP
	resources to establish or improve the RTC value chains • Monitoring outputs of respective function • Assistance in the promotions of products		
Department of Labor and Employment (DOLE)- provincial and regional	• A registration agency of local POs; potential source of fund assistance for needed resources to establish or improve the RTC value chains • Monitoring outputs of respective function	X	X
Department of Social Welfare and Development (DSWD)- local, provincial, and regional	• Potential source of fund assistance and in the promotion of RTCs for health and nutrition through home gardens through its 4Ps program and other fund assistance windows (e.g., KALAHI-CIDSS) • Registration through DSWD also facilitates access to DA funds	X	X
Department of Agriculture (DA)- provincial and regional	• Potential partner for production support and fund assistance, especially production of nurseries and establishment of postharvest (e.g., processing) facilities through the Corn-Cassava and High-Value Crop Development (HVCDP) Projects	X	X
State universities and colleges (academe) **Samar State University (SSU)**	• Potential technology sources and local partners for prioritizing and testing appropriate innovations	X	
Bohol Island State University			X
Private sector **TBK company**	• Seaweed export market; now linked with existing seaweed producers. (Seaweed producers will need to organize better for collective marketing for a better price and business negotiations.)	X	
Milkfish buyers/traders	• Local traders in Tacloban City (Links with fisherfolks in focus sites need to be improved)	X	
Focus POs	• Beneficiaries and local partners in the project • Involved for the holistic implementation of the planned activities for the overall sustainability of project initiatives even beyond the project life	X	X

The focus POs through which RTC livelihood interventions will be implemented in the project sites are the following:

<u>INREMP - Bohol</u>

- Lundag Eskaya Tribe Multipurpose Cooperative (LETMULCO)
- Concepcion Livelihood Environmental Association Project (CLEAP)

- Nagkahiusang Mag-uuma sa San Vicente Association (NMSVA)
- San Miguel Association Resource Team (SMART)
- San Carlos Association for Rehabilitation of Environmental Denudation (SCARED)

These POs have approved proposals for agro-forestry and livelihood development for 2015 under the INREMP project.

FishCORAL – Eastern Visayas

There are no organizations identified yet for the FishCORAL sites. However, the possible RTC areas/value chains include:

- Milkfish processing chain (Tanauan, Leyte)
- Noodles with fish; cassava processing (Tolosa, Leyte)
- Sweetpotato fresh root market enhancement and processing (Dulag)
- Seaweeds, other aquatic resources with RTC livelihood system (Tacloban, Lawaan, E. Samar)
- *Binagol* processing and multi-RTC improved marketing (Calbiga, Western Samar, and Lawaan, Samar)
- RTC-based aquaculture feeds (Basey, Samar) and Lawaan; dried cassava chips for the SMFI plant in Ormoc City.

5 KEY CONSTRAINTS AND OPPORTUNITIES FOR RTCS TO ENHANCE FOOD RESILIENCE

5.1 Issues related to vulnerability, resilience capacity, and role of RTCs in post-disaster situations and extreme weather events

The FishCORAL and INREMP FGD participants highlighted the important role of root crops as survival and reserve crops during disasters and extreme weather events, as well as a source of income for small farming families.

In FishCORAL sites, the men and women FGD participants, who are farmers/fisherfolks living in coastal barangays, mentioned their vulnerability in disaster situations and extreme weather events. Their livelihoods are based on farming and fishing, which are highly dependent on the weather. The men and women shared their experiences after Typhoon Haiyan and said that life has been difficult. Majority of their crops (coconut) were rendered useless by the typhoon and they had to look for non-agricultural side jobs to survive. The role of RTCs as a food source in times of calamity has been highlighted. The FGD sites are known to have regularly grown root crops in their fields, which are used as snack or substitute for rice or processed into delicacies such as cassava cake, cassava pie, deep-fried carmelized sweetpotato (camote cue), aroid snack food (*binagol*), and others. The root crops are also sold as fresh root.

At INREMP sites, participants were mostly engaged in crop and livestock production. However, during lean harvest months, they did non-agricultural activities such as carpentry, food vending, *pasuhol* etc. They also shared stories on the earthquake's aftermath, which had shaken their way of living. They have grown root crops in their backyards and sold these in their community. Root crops substituted for rice at times. The common root crops grown were cassava, yam, taro, and sweetpotato, which, according to them, is weevil-infested.

5.2 Perceptions of food security and insecurity

Both FishCORAL and INREMP participants shared the same perceptions on food security and insecurity. Food security to them means that you have something to give to your family every meal. As parents, they would do anything to provide food for their children. Root crops have an important role in food security, as staple food and as survival crop in times of disasters.

5.3 Changes in the roles of men and women

Majority of the FishCORAL participants said that women are more than or as equally active as men when it comes to livelihood responsibility. The women are the ones who take charge of the house and the children, while the men do heavy work/activities. Other women also said that they usually go with their husband and help them fish. Planning is usually done by women; they engage in alternative jobs such as food vending, tending a store, and money lending. On the other hand, the INREMP participants said that men still direct household activities and do the heavy work. Women have a supporting role in daily livelihood activities, taking care of the children and doing household chores. No major gender issues were brought out during the FGDs.

5.4 Perceptions of "good" food, consumption and nutrition, and livelihood activities

People's food choices affect their health. A balanced nutrition is important to keep one active every day. The FishCORAL and INREMP participants have a common perception of what constitutes good food and they realize the importance of consumption and nutrition in achieving good health. The participants cited that good and nutritious food includes rice, vegetables, fish, and sometimes meat. Their food is mostly sourced from their own produce or bought from stores (e.g., canned goods, noodles, etc.).

5.5 Adaptive or organization capacity

In FishCORAL sites, there are existing and well-known active organizations that had benefited from continuous training and seminars. In fact, in one of their sites in Tolosa, Leyte, are a number of organizations specializing on food processing. In Hinunangan, Basey, Lawaan, General Macarthur, and Calbiga, there are also farmer and fisherfolk organizations already established. San Sebastian is still in the process of establishing its POs.

The INREMP Bohol sites differed in that there are already existing groups with committed funding. Eight POs operate in the area: Lundag Eskaya Tribe Multipurpose Cooperative (LETMULCO), Concepcion Livelihood Environmental Association Project (CLEAP), La-Esperanza, Farmers, Association Inc. (LAESFA), Nagkahiusang Mag-uumasa, San Vicente Association (NMSVA), San Miguel Association Resource Team (SMART), Catigbian Waterworks and Sanitation Association (CAWSA), Mag-uumang Nagkahiusasa Nueva Montaña (MANANUM) and San Carlos Association for Rehabilitation of Environmental Denudation (SCARED), which are being assisted by NGOs and DENR.

However, the farmers expressed the need for more organizational and support services in order to address various constraints related to financing and availing of technologies.

In addition, local government units have admitted that RTCs are not their priority in the face of the limited budget on agriculture.

6 CONCLUSIONS: KEY FOCUS AREAS, AND PRIORITIES FOR ACTION RESEACH AND POLICY INFLUENCE

6.1 Opportunities

RTCs are grown in most areas, and farmers/fisherfolk are willing to work for increased production and enterprise development; but, they need assistance in securing technologies, markets, financing, and management expertise. RTCs are suitable components of the watershed (INREMP) and agri-aqua (FishCORAL) systems as food and cash sources and are ideal for climate change adaptation and mitigation. Technologies (on RTC and related complementary uses) are available, and R&D agencies are present to support enterprise development. POs and partners are willing to adopt the Farmer Business School approach and other methodologies for livelihood development. FishCORAL and INREMP and other line agencies (DA, DOLE, DTI, DOST) as well as NGOs (local and international) are major sources of funds/grants for RTC enterprise development in complementation with local project priorities and thrusts. Capacity development has been identified by POs as an important need and these groups are more likely to be cooperative. Agro-ecotourism has huge potential for RTC businesses, as well as community-based endeavors.

6.2 Prioritization

RTC information campaigns are a must to create awareness of RTC uses and benefits and technologies needed to improve quality. Priority should be given to identifying selective start-up RTC nurseries for quality planting materials through POs, communities, and lead farmers in partnership with LGUs and R&D agencies; further validation of pilot POs of their capabilities and strengths in business development; and giving them technical assistance to in drafting specific action plans. An inventory of RTC and related technologies specific to the PO influence area site must be done. Efforts to integrate RTCs and their utilization and development in the Bottom-up Budgeting (BUB) of Local Government Units at least for 2016 onward should include capacity building among technicians and implementers to facilitate development activities.

6.3 Agreed action plan

All partners and relevant agencies must be oriented toward collaborative partnership, the approach and process involved, and how findings from specific sites be effectively implemented. To ensure success, it is critical that the following actions be made: social marketing activities led by FoodSTART+; provision of LGU

budget for RTC development, inventory of applicable RTC technologies based on scoping study results, and capacity development of technicians, POs, and other project implementers.

Table 17. Potential RTC enterprises that can be launched in FishCORAL focus sites

FishCORAL site	Enterprises
Basey	RTC-based aqua feeds; sweetpotato and taro for fresh roots, with/without minimal processing
Calbiga and Lawaan	Improved farm enterprises of RTCs (focus on improved yield); improved *binagol* processing
Tacloban, Lawaan	Seaweed farming and RTC processing by women entrepreneurs
Tanauan	Enhanced milkfish value chain with RTC processing (sauce, vinegar, ornamentals, roots)
Tolosa	Cassava processing; sweetpotato and fish noodles
Dulag	Sweetpotato processing; improved marketing of fresh roots
Hinunangan-Silago	Cassava flour-based processing (linked with grates flour processing)

Table 18. Potential RTC enterprises that can be engaged in by POs under INREMP

INREMP	Enterprises (within the agro-forestry context)
SMART	RTC production and processing
SCARED	RTC production and processing
CLEAP	RTC production and processing
LETMULCO	Improved indigenous sweetpotato processing and marketing
NMVSA	RTC production and processing

7 WORKS CITED

Bureau of Agricultural Statistics. (2015). Retrieved 2015, from Bureau of Agricultural Statistics: www.bas.gov.ph

Department of Agriculture. (2012). *Food Staples Sufficiency Program: Enhacing the Agricultural Productivity and Global Competitiveness 2011-2016.* Quezon City, Philippines: Department of Agriculture. Retrieved from http://www.pinoyrice.com/wp-content/uploads/Food-Staples-Sufficiency-Program.pdf

Department of Agriculture. (2015). *PRDP: Expanded Vulnerability and Suitability Analysis (eVSA)*. Retrieved from Department of Agriculture, Philippine Rural Development Project: http://www.evsa.daprdp.net/

Department of Environment and Natural Resources. (2015). *INREMP: Background of the Project*. Retrieved 2015, from INREMP, Forestry Management Bureau, Department of Environment and Natural Resources: http://forestry.denr.gov.ph/inremp/about.html

Food and Nutrition Research Institute, DOST. (n.d.). *National Nutrition Survey.* Retrieved 2015, from Food and Nutrition Research Institute, DOST: http://www.fnri.dost.gov.ph/index.php/nutrition-statistic/19-nutrition-statistic/118-8th-national-nutrition-survey

Human Development Network. (2013). *2012/2013 Philippine Human Development Report.* Retrieved from Human Development Network: http://hdn.org.ph/wp-content/uploads/PHDR%202012-2013%20Geography%20and%20Human%20Development.pdf

Jabines, A., & Inventor, J. (2007). *Greenpeace Southeast Asia.* Retrieved from Greenpeace: http://www.greenpeace.org/seasia/ph/Global/seasia/report/2007/4/the-philippines-a-climate-hot.pdf

National Economic and Development Authority. (2011, February). *National Economic and Development Authority Region VIII - Eastern Visayas.* Retrieved from National Economic and Development Authority: http://www.neda.gov.ph/wp-content/uploads/2013/10/RegVIII_RDP_2011-2016.pdf

National Economic and Development Authority. (2014, March). Retrieved 2015, from http://nro8.neda.gov.ph/development-plans-2/

National Nutrition Council. (2014). *Operation Timbang 2014.* Retrieved from National Nutrition Council: http://www.nnc.gov.ph/downloads/download/66-region-7-facts-figures/585-operation-timbang-2014

Philippine Statistics Authority. (2015). *Philippine Poverty Statistics*. Retrieved from Philippine Statistics Authority: http://psa.gov.ph/poverty-press-releases/data

Provincial Planning and Development Office, Bohol. (2014). *Annual Report 2014*. Retrieved from PPDO Bohol: http://www.ppdobohol.lgu.ph/plan-reports/annual-reports/annual-report-2014/

ANNEXES

Annex I. HIGHLIGHTS OF THE STAKEHOLDERS VALIDATION MEETING

FoodSTART+ stakeholders' validation workshops were conducted to present and validate the outputs of the scoping study conducted in about two months from October to November in sites of the IFAD investment projects FishCORAL-BFAR Region 8 (38 municipalities) and INREMP-DENR Bohol (4 watersheds) sites. The results presented the summarized analyses taken from secondary and primary data-information on root and tuber crops (RTCs). The results presentations and their validation among the different stakeholders helped define the challenge(s), issue(s), and opportunity(ies) in relation to root and tuber crops (RTCs) production, livelihoods, and food vulnerability in the pilot areas; and facilitated the setting of action for research and development action.

The validation workshop is an activity designed to inform the community members in potential sites and relevant stakeholders on the results of the scoping study; ascertain the accuracy of findings; and further discuss or clarify the scoping study results.

1. Summary Results of the Scoping Study relevant to the FishCORAL investment project

Vulnerabilities: Natural and Socio-economic

- Evidence from historical and secondary data on the vulnerabilities, both natural and socio-economic, that the fisherfolks in the pilot sites of the four bays have been exposed to and victims of in the past decades, even up to a hundred-year precedence of storm surges, and increasing strength of typhoons.
- Poverty incidence of the region is one of highest (top five), and particularly so those in the coastal areas. Malnutrition showed some positive note; however, child malnutrition is still bit higher than the nationally acceptable range.

Production, Farm systems and Seasonality

- Trend of production is decreasing except for cassava, before Haiyan, which experienced increases due to the introduction of cassava for the feeds market. Immediately after Haiyan, however, this suffered a slump. The harvest of root crops, however, right after the super typhoon, provided food to communities that grew them. Root crops, especially sweetpotato and cassava, were major part of the relief and rehabilitation phase where their planting materials were distributed throughout the region.
- That fisherfolks are at the same time upland farmers, engaging in both marine-based livelihoods and cultivating patches of crop-growing in order to survive; mitigating the ill-effects of monsoons that result to hunger and cash-strapped months. Root crops such as cassava, sweetpotato, taro and aroids

together with banana and some local vegetables are very important part of this mixed system that uses traditional practices.

- The FGDs reveal the distinct patterns of seasonality of marine-crops system; thus, seasonality in the availability of food and cash. Given the current vulnerabilities of weather and inadequacy to market linkages, their livelihoods are mainly unstable, and far from providing sustainable sources of income.
- On the average, root crop yields in the region are low: SP only about 5 tons per ha, cassava about 10 tons/ha. Cassava in pockets of commercial production in western part of Leyte yields about 20-40 has on average; sweetpotato, about 20-25 tons/ha. But in the pilot sites in coastal communities, yields are closer to the low national average.

Food-Cash source and Processing

- RTCs play very important role in the four bays both as food (staple, snacks) and cash. Many areas are engaged only in semi-commercial basis, that is, where the surplus is locally sold. Most grow RTCs in subsistence scale, where root crops are grown throughout the year (i.e. priming system is practiced; others plants are maintained as stored roots ready for the non-palay harvest periods) depending on the availability of small fields and when labor is available. Pockets of commercial production are found in Dulag (sweetpotato, taro), Calbiga-Pinabacdao areas (taro, aroids, sweetpotato, cassava), Hinunangan-Silago (sweetpotato, cassava).
- RTC processing is traditionally done only irregularly for snack foods; cassava chips processing already introduced in Salcedo Samar and sold locally.
- Five women groups in Tolosa, Leyte have undergone trainings on root crops processing and are beneficiaries of a JICA-provided processing facility. They, however, have not been systematically organized to develop livelihoods nor enterprises. They expressed strong desire to be assisted. A cooperative in Tolosa had been a pilot of VSU-Tolosa campus in SP with fish noodles in 2008. This has stopped for the moment.
- All fisherfolks-farmers' groups subjected to FGDs expressed desire to integrate RTC processing as much needed additional livelihood due to the vagaries of weather disturbances to their fishing/marine-based livelihood.

Opportunities and Constraints of RTCs

- While RTCs are grown in most areas by fisherfolk-farmers, they seriously lack access to information and technology, except to those who had undergone trainings supported by LGUs or some projects. Only through the food relief and rehabilitation efforts post Haiyan were these areas introduced high-yielding nutrient-rich varieties from PhilRootcrops-VSU through the Philippine Coconut Authority, the Department of Agriculture, and international NGOs (Catholic Relief Services, OXFAM, Food and Agriculture Organization, etc.).

- Areas that had access to RTC technologies (mainly HYVs) include Dulag-Mayorga (SP, cassava), Salcedo, Samar (cassava and taro), Basey (SP), Tolosa (SP, cassava), Silago-Hinunangan (cassava), Pinabacdao-Sta. Rita (SP, cassava).

Opportunities and constraints that were specified and validated during the workshop included:

Calbiga-San Sebastian Group

- Enterprise development-capacity development
- Readiness of PO and community organization to establish enterprises
- Severe-lack of Agriculture and Fishery personnel-generalist/specialist
- llegalities issue, budget, markets, identification of priorities or process

Silago, Hinunangan and Tolosa Group

- LGU, no budget for capacity development and livelihood development (BUB project livelihood)-multi-tasking-overloaded LGU Technician
- National-human Resources, incentive; basic costs logistics

Lawaan-Basey (Matarinao-Leyte)

- Quality of Seaweeds: Maturity, processing
- Availability of technical assistance from R&D/academe: Samar State University/CIP FoodSTART+, VSU-PhilRootcrops
- Proximity to Tacloban markets
- Possibility: family based small scale farming-market collective/assembly marketing;
- Available lands for expansion of production
- Lack of Market links-volume not big enough to supply current markets
- Fisherfolks-farmers lack motivation to expand
- Lacks market orientation

2. Summary Results of the Scoping Study for INREMP sites

General Situationer and Vulnerability

INREMP reports (2014) pointed to the degeneration of watershed, and recommended that this needs to be addressed urgently; and agro-forestry is an important component to provide livelihoods that can highly likely prevent encroachment into the forest Bohol is vulnerable to disasters; and is one of the provinces with high incidence of poverty. Though malnutrition is not high; still a bit higher than the normally acceptable average.

POs that were given priority for funding agro-forestry component for 2015 reported that low socio-economic status and low farm productivity are mainly due to lack of markets or linkage to markets, lack of information and access to technologies, lack of development initiatives that effectively improve their incomes, and low priority by LGUs on agriculture development.

RTC Production

RTCs production has been declining since the turn of 2000 due to the high incidence of phytoplasma in cassava (particularly from 2005), and anthracnose in purple yam, as well as SP weevil in sweetpotato. The lack of markets is also a disincentive to increase production. RTCs such as sweetpotato, cassava, taro and aroids, and yam are important parts of their mixed farm systems; grown the year-round depending on the growing season of a root crops. Farmers make sure RTCs are available to free them from hunger during cash strapped months; or with no rice harvest. They are grown mainly for supplemental staple and cash.

Traditional RTCs have relatively low yield; except for a few farmers (San Vicente, San Miguel) who were able to access HYVs from technicians or other farmers. SP 30, 25 and 17 are already in some fields with higher yields than the local cultivars.In the agro-forestry system, RTCs were recommended to be grown with fruit trees like rambutan, lanzones, etc.

Markets, Processing and Utilization

Few farmers are linked to local markets. They face competition from farmers in Northern Mindanao who have already gained entry in the Tagbilaran markets. They lose out in price competition since these outside farmers are relatively more efficient when business deal is in volume, and their farming more intensive RTCs are either boiled for home use, or fried on a stick for snack like the sweetpotato cue. There are intermittent local food processing for school canteens.

People's Organization

All identified five POs (LETMULCO, NSCVMCO, SMART, CLEAP, SCARED) have been registered and with approved proposals for their enterprise in agro-forestry areas. They will need further strengthening and skill building for business. The Eskaya (LETMULCO) tribe has opportunity from ethnic branding of products for promotions. The Danao-Dagohoy POs can make use of the agro-ecotourism opportunities. With the farm lands in relatively high slopes, different varieties may be fitted, and different product developed. These need further exploitation for business.

Governance and Support Services

LGUs give low priority to RTCs; but they are interested when informed of the benefits of RTCs. INREMP provides ample support for RTC development as integral part of agro-forestry component. With improved awareness of the potentials of RTCs to achieve food resilience and livelihoods among communities and

households, LGUs and other support service providers can partner for RTC-integrated agro-forestry development. The stakeholders' workshop provided insights and initial cooperation among local agencies. The challenges for INREMP lie in the development of the RTC value chain.

Annex 2. List of Information and Target sources

Secondary information / Reconnaissance	Socio-economic and development context (based on Socio-economic Regional Profile, current; 5/10 years earlier; Human Development Index, HDI, poverty incidence, incomes/ livelihoods, economic activities): Region and project sites (4 bays of FishCORAL; INREMP Inabanga watershed, Bohol) Regional Development Plan, recent Policy environment relevant to RTCs (crop production planning, market/industry development, nutrition and health policy…) at national, provincial and local levels as appropriate Relevant projects reports and documents related to FishCORAL sites: Maqueda Bay, Matarinao Bay, Leyte Gulf, Silago-Cabalian Bay; INREMP, Inabanga watershed	National Economic Development Authority (NEDA); Regions 8 and 7
	Overlap of the sites of investment projects and Root crop production (FGD sites).	FishCORAL (Region 8) INREMP (Bohol) Department of Agrarian Reform (DAR)
	Biophysical data (soils, climate…) and provincial level land use map – may be available for downscaling from global GIS related sources	FishCORAL (Region 8) INREMP (Bohol) Department of Agrarian Reform (DAR) PAO/MAO Provincial/Municipal Planning and Development Council
	Hazard maps	DENR
	RTC production (including seasonality, varieties/biodiversity), processing marketing and consumption (fresh roots, processed and derived products, leaves/vines, animal feed use etc.). Also industrial applications, if relevant. • Current and historical information (back to 2000 if possible) • Attention paid to vulnerability factors/issues	Department of Agriculture (DA) region VSU-Philrootcrops
	Value chain descriptions, key industry players	VSU-Philrootcrops
	Dietary, consumption and nutrition/health data relevant to RTCs especially for women and children (e.g. malnutrition, Vitamin A status, level of RTCs consumption if available)	National Nutrition Council – Region 8, Bohol; FNRI DSWD/ Kalahi-CIDSS; DOH; relevant projects
	Previous R&D actions in the target region: past project reports (national and international)	WESAMAR

Field appraisals (key informant interview; informal interviews)	verifying secondary data (and filling gaps) understanding trends, opportunities and challenges	Government agencies/institutions in agriculture R&D (Region 8 DA, National Nutrition Council, etc.) NGOs (project staff of CRS, OXFAM, FAO etc) Value chain actors (RTC traders, seaweed company, etc.) Other CGIAR Centers and CRPs if present (ICRAF?) Previous projects that used to work on RTCs (WESAMAR)
	Value chain descriptions: trading-industry-utilization nodes	PhilRootcrops, VSU;
Field appraisals (focus group discussions)	RTC production, markets/ marketing and rural processing; RTCs in fish-farm livelihood & food systems RTC contribution to agro-ecosystem RTCs related to livelihood/food vulnerability, resilience capacity, role of RTCs in post-disaster situations and extreme weather events. Perceptions of food security and insecurity, patterns/changes in household diets/ food consumption Changes in roles of men and women, perceptions of "good" food/diet, consumption and nutrition, livelihood activities, migration. Other issues around gender that need to be explored. Adaptive or organization capacity in terms of coping strategies to CC impacts Local practices to adapt to food scarcity; livelihood instability; extreme weather events	Men and women RTC farmers and fisherfolk Farmer group leaders Cooperative leaders
	Value chain descriptions: farmer-trader-processors nodes	VSU-PhilRootcrops

Annex 3: FishCORAL Workshop outputs

1. San Sebastian-Calbiga Group

Stakeholders category	Problems/ Challenges	Present opportunities	Action/Intervention	Responsible
Fishersfolks-farmers group	• Lack of alternative livelihood • Lack of technical assistance	• Farmers, fisherfolks having legal personalities • Presence of upland areas or vacant areas for root crops growing	• Building/Strengthening capacity; enterprise development • Provisions of planting materials, capital and technology	• Peoples Organizations, LGU, BFAR, DTI • DA, BFAR, DOLE & NGO
Local government	• Meager budget allocated for agro-fishery related PPA's • Lack of Manpower/personnel that resulted to multi-tasking • Political rivalry (San Sebastian	• Supportive LGU Officials (Calbiga Only) • Presence of skilled/well trained technical experts within LGU	Refresher courses for LGU personnel (training purposes)	DA-ATI, BFAR
National Government	• Unregulated/illegal fishing activities • Multi-tasking	Enactment of RA 10654-Approved Municipal Fishery Ordinance	• Strict implementation of the Law (File a case where applicable • Hiring of personnel to augment the organic personnel	• BFAR, Coastguard, MARINA, FLET • BFAR, Civil Service Commission
Academe/Research	Lack of financial resources for research purposes	Personnel/Pool of Technical Experts	Research Proposal drafting (participatory approach)	VSU, SSU, ESSU
Private Sectors	Limited market for fish-farm products	Agro-fishery products with high market demand 4 market days in Calbiga	Market Linkage, Processing Technology	PS, LGU

2. Tolosa-Hinunangan Group

Stakeholders Category	Priority/Problems	Present Opportunities	Proposed Action/Intervention	Responsible
Farmers/ Fisherfolks group	• Lack of high quality planting materials • High cost of farm inputs • Lack of market information • Lack of post-harvest facilities • Limited access to finance	• Presence of agencies offering planting material • Assistance from DA (limited) • Available area/land for root crop production • Strongly established farmers and fisherfolks association	• Make proposal for training livelihood program • Link to related agencies for marketing, post-harvest facilities and farm inputs	MAO/AT, BFAR, DA, Association President
LGU	• Limited budget for livelihood program and capacity building • Limited assistance for livelihood programs in coastal communities	• Incorporate project to BUB and other potential sources • Existing organized/ functional/association • Potential areas for livelihood; fishery, livestock and farming	• Conceptualize through proposal of the project • Identify possible livelihood project through consultation farmers and fisherfolks and other concerned government agencies	MA/AT BFAR, DOLE, DA
NGA's	• Multi-tasking of personnel • Procurement Process • Logistics	• Availability of training for skills development • Availability of data-based system, existing policies • Well-trained, experienced BAC and TWG member • Present projects	• Request for additional incentive • Recommend to BFAR CO a special procurement/document process	National office

3. Basey-Lawaan Group

Stakeholders Category	Challenges	Opportunities	Intervention	Responsible
Farmer/Fisherfolks Groups	• Lack of local market for seaweeds and root crops (sweetpotato, cassava, gaway) • Absence of seaweed consolidators at Lawaan, Eastern Samar • Low quality of dried seaweeds • Inadequate of farm to market roads from upland farms to the market • High cost of aquaculture feeds	• Support of Municipal LGUs and national agencies in • Terms of production of tubers and root crops and seaweeds • DOLE registered farmers-fisherfolk groups • Variety locally available ingredients (sweetpotato, cassava, gaway) • Proximity to the regional capital	• Establishment of farmer-fisherfolks • Business/enterprise groups • developed • Establishment of good market linkages • Additional technical know-how on production and processing • Establishment of village level feed mill • Availability of technical know-how on feed formulation	BFAR, LGU, DA, VSU
Local Governments	• Lack of tubers and root crops technology on production and processing • Lack of high quality planting materials for distribution	• Potential RTC areas • Availability of hardworking agricultural technicians	• Conduct of technology trainings • Provision of hybrid planting materials • Collaboration with NGAs and NGOs	VSU, BFAR, LGU, DA
National Governments	• Lack of manpower for technical assistance to beneficiaries • Procurement system adversely affecting implementation of projects	• Sufficient funds for the projects • Mature technology for roots and tuber root crops and seaweeds production • Well-trained BAC and TWG Members	• Hiring and capacitating technical • Personnel who will focus on the • implementation of projects • Assignment of non-technical personnel for BAC functions	BFAR, DA

Annex 4. INREMP Workshop Outputs

1. Lundag Eskaya Tribe Multipurpose Cooperative (LETMULCO)-San Vicente Group

Stakeholders Category	Priority Problem/Challenges	Present opportunities	Proposed Action/ Intervention	Responsible
Farmer's Group	• Lack of knowledge on root crop planting • Lack of capital (labor, production inputs) • No regular/ready market of farm produce • Lack of marketing strategies • No security of land tenure (San Vicente)	• Presence of experts from DA and CIP • Availability of NGA's (DOLE, BES-planting material) • Existing value chain analysis • Existing tenurial instrument of the Eskaya tribal community	• Conduct trainings and seminars • Source out fund thru project proposal preparation to any funding institution • Strengthen farmer's association • Market Linkaging • Conduct Training on value adding and Processing • Issuance of tenurial arrangement	• PO, DA, CIP, INREMP • PO, DA, FA, MAO • PO-FA, MAO, OPA • PO, DENR
Local government	Limited fund	BUB, presence of NGA's	Inclusion in the BUB, proposal preparation	LGU/MAO
National Government	None acceptance of PO's to government projects	Existence of project development like INREMP	IEC (Information Education Campaign	DENR/INREMP
Academe	Research results not readily available (on-farm trial)	Research are conducted on farm	Collaborate with PO's and NGA's	SUC'

2. San Carlos Association for Rehabilitation of Environmental Denudation (SCARED)

Stakeholders' Category	Priority Problems/Challenges	Present opportunities	Proposed Action	Responsible
Farmers Group	• Lack of planting materials; suitable high yield varieties • Pests and Diseases esp. "bokbok" of sweetpotato • Financial • Advance market linkages • Low Production	• Additional Household Income • Convertible to any product derivatives • Possible link with tourism sector	• Link with DA • Conduct technical trainings on production & cost harvest technology • Avail loan or grant	• INREMP • FoodSTART+ • DA • LGU
Local Governments	• Limited budget of MAO office • Non-priority programs	• Food Resilience (current thrust of LGU's)	• Promote backyard gardening • Agricultural office for more agricultural support	MAO/Technician
National Governments	• Conflicts of national Programs (Organic Agriculture and Inorganic agriculture	Funding source	Promote organic farming	
Academe/Research	Limited Access	Product of research benefits	Farmers field School (FFS)	
NGO's	Limited term of program	Funding	Project proposals	
Private Sector (companies)	Not priority for investments			

3. Concepcion Livelihood Environmental Association Project (CLEAP)

Stakeholder's Category	Priority Problems/Challenges	Present Opportunities	Proposed Action/ Intervention	Responsible
Farmer groups	• Lack of planting materials • Inaccessibility of goods/products to market • Inadequate water supply • Lack of technical training • High cost of production • Low cost of value in the market • Lack of farm implements • Erratic weather condition or climate change • Lack of capital (financial)	• Presence of DA, DENR, and other agencies • Line agencies that finance farm to market roads • Presence of line agencies that finance small farm impounding • Presence of agencies that provides capacity buildings • Presence of line agencies with technical know how • Market linkaging • Linkaging to line agencies, banks, NGOs for facilities and financial support • Presence of NGOs and government agencies that support climate change mitigation/adaptation • There are agencies and banks that extend soft loans/semi-grants	• Requests for: • quality plating materials • construction of FMR to line agencies • construction of small farm impounding to line agencies • trainings on modern farm technologies • training on modern farming technologies (organic farming) • marketing linkages • line agencies (DA, DAR, LGU) to assist • Planting of crops adaptable to climate change and request trainings for climate change adaptation • grant/loans to funding institution	All relevant line agencies such as: where applicable: • LGU, DA, DAR, DPWH, DENR • POs • NGOs
Local governments	Low priority on RTC production (low budget)	New technologies on RTC production	Appropriate funds for RTC production. Enact ordinances and resolution supporting RTC production program	• MAO • Sanggu-niang Bayan

The International Potato Center (known by its Spanish acronym CIP) is a research and development organization with a focus on potato, sweetpotato, Andean roots and tubers. CIP is dedicated to delivering sustainable science-based solutions to the pressing world issues of hunger, poverty, gender equity, climate change, and the preservation of our Earth's fragile biodiversity and natural resources.

CIP Philippines
PCAARRD, Los Banos, Laguna 4030 Philippines
Tel +63 49 536 8185 | Fax + 63 49 536 1662
E-mail: cip-manila@cgiar.org
www.cipotato.org

The International Center for Tropical Agriculture (CIAT) develops technologies, methods, and knowledge that better enable farmers, mainly smallholders, to enhance eco-efficiency in agriculture by making production more competitive and profitable as well as sustainable and resilient through economically and ecologically sound use of natural resources and purchased inputs.

CIAT Regional Office for Asia
Km2, Pham Van Dong Street, Bac Tu Liem District,
Hanoi, Vietnam
Phone: +844 3757 6969 | Telefax: +844 3757 0999
Email: d.campilan@cgiar.org
www.ciat.cgiar.org

The CGIAR Research Program on Roots, Tubers and Bananas (RTB) is a broad alliance led by the International Potato Center (CIP) jointly with Bioversity International, the International Center for Tropical Agriculture (CIAT), the International Institute for Tropical Agriculture (IITA), and CIRAD in collaboration with research and development partners. The shared purpose is to tap the underutilized potential of root, tuber and banana crops for improving nutrition and food security, increasing incomes and fostering greater gender equity, especially among the world's poorest and most vulnerable populations

www.rtb.cgiar.org